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Orientation in Public Health*

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WHEN preparing this paper, I was first impelled to detail some of the technics being used in the evaluation of public health procedures. But on setting them down for inspection and further delineation, it became obvious that there is no technic peculiar to studies of administrative practice. As in the case of epidemiology, the occasion may arise for drawing upon any method that has been found useful in political, social, or biological fields of inquiry. One question may be explored by statistical analyses of morbidity and mortality data; another by making physical examinations, supplemented perhaps by laboratory tests, of particular population groups; problems relating to environment may give rise to questions of an engineering character; perhaps it is the efficacy of an immunization or a therapeutic measure that is to be tested, thus a clinical approach may be needed to settle the issues involved. Since the words "public health" usually connote mass action and considerable measure of popular support, social concepts, economic resources, and costs of service must be taken into account no less than the effectiveness of the public health procedure itself; hence the necessity often arises for having political, social, and economic sciences represented in studies of administrative practice. Perhaps the latest development in evaluation is the attempt of a few workers to utilize technics of educational measurements in the appraisal of health education.

Any one among a number of subjects might have been selected to illustrate the application of these several technics and disciplines, but at this time orientation with respect to needs and opportunities seems the most important item for study. By way of introduction, the broad question of orientation may be phrased in three separate but related parts: What is the status of the nation's health? What controllable factors are most influential in determining this status? What sort of organized effort on the part of society is needed so that individuals and communities may achieve the highest attainable level of well-being?

As measures of the nation's health, morbidity and mortality still hold commanding positions in the estimation of

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public health analysts, although the slogan "positive health" which came into popular usage some 25 years ago has tended to divert attention from the more obvious expressions of human vitality. Of the two, death is the more definite phenomenon. However, it happens only once in the life of the individual whereas illness occurs many times. Illnesses of certain types are prone to terminate fatally, while others tend to be self-limited and usually end in recovery after varying periods of disability. As a matter of fact, the common cold is among the most frequent causes of illness; yet this condition is not accepted as a primary cause of death. Thus it is evident that gross mortality rates cannot be translated into illness rates, especially if one wishes to obtain an expression of disability and costs accruing therefrom.

The characteristics of mortality data and the whole procedure of certification are well understood by the group to which this paper is addressed. On the other hand, systematic collection and analysis of sickness data are rather new ventures in public health practice; hence a few words on procedure may not be out of place.

Perfection in a morbidity intelligence service would entail a medical diagnosis for every departure from normal experienced by all members of the population, this to be reported to some central agency. Such a scheme would, of course, fall of its own weight. Furthermore, this plan is not practicable under present conditions, even in a modified form, since physicians do not see all cases of illness; neither has it been deemed expedient to make systematic reporting compulsory. Records of persons covered by prevailing sick benefit schemes afford valuable information, but these persons are highly selected as a rule on the basis of age, sex, occupation, geography, and other factors. In surveys of general illness, collecting information, by means of the family interview, from representative samples of the population, has proved to be the method of choice under present circumstances. For particular diseases, especially of the more serious types that are apt to receive medical attention, the information may

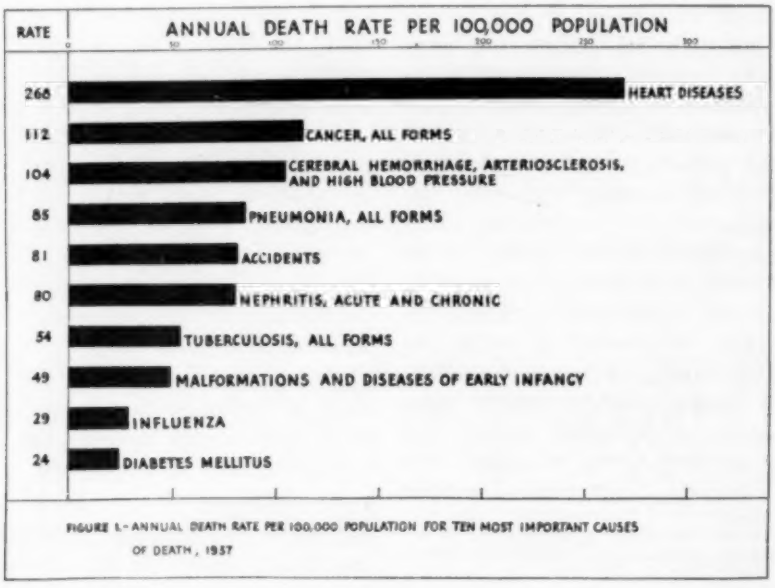

FIGURE 1.—ANNUAL DEATH RATE PER 100,000 POPULATION FOR TEN MOST IMPORTANT CAUSES OF DEATH, 1937

be obtained directly from physicians, hospitals, and clinics. Data on illness collected in either manner, when coupled with mortality records, furnish criteria for estimating the health status of a community that are sufficiently reliable to guide administrative action. It is rather strange that public health practice has been influenced in only a minor way by the very obvious leads that flow from such data. A few well known vital phenomena are contrasted with administrative practice to show obvious failure in the use of available information.

Very young infants, for example, have not shared equally in the reduction of mortality which has been accomplished for children of all other ages; notwithstanding, most health departments concentrate attention on older children at the expense of infants. At the other end of the scale there are accumulating large numbers of persons in the advanced age brackets who have reached the period when vital forces must be conserved; yet public health offers little to the adults who face chronic disease and declining economic efficiency.

The inappropriate distribution of public health effort becomes more apparent when mortality is analyzed by specific causes. To illustrate this point, ten of the most important causes of death in 1937 [1] arrayed in the order of frequency are presented in Figure 1. Aside from heart disease which presents a rate more than twice that of its nearest competitor, other rates descend in regular order of magnitude from cancer with 112 to diabetes with 24. These conditions taken together account for more than 79 per cent of all deaths. Against only one of them—tuberculosis—do health departments take very specific action at the present time. By contrast, the whole group of acute communicable diseases on which most public health effort is directed accounts for only 3 per cent of the mortality. This differential treatment cannot be justified on the basis of proportionate reward for effort.

Another and more revealing picture is obtained by using illnesses instead of deaths to measure need for service. As mentioned previously, a person dies only once, but he may be ill many times during the course of his life. Taken in

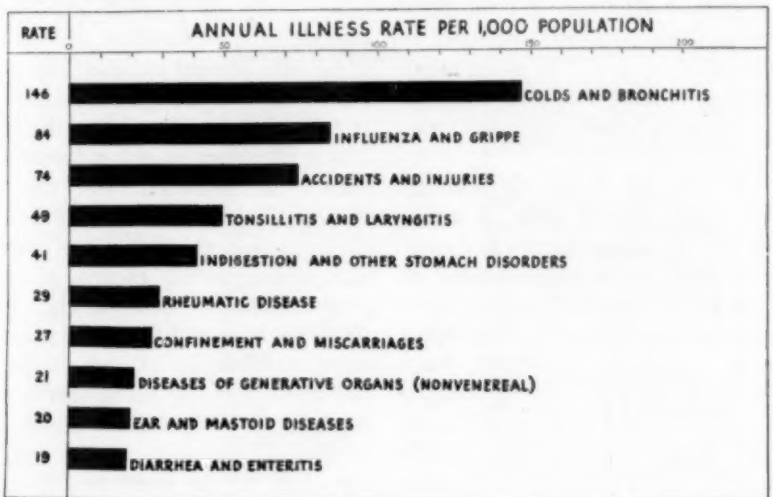

FIGURE 2.-ANNUAL RATES OF ILLNESS FROM TEN LEADING CAUSES IN CANVASSED WHITE FAMILIES IN 18 STATES, 1928-31

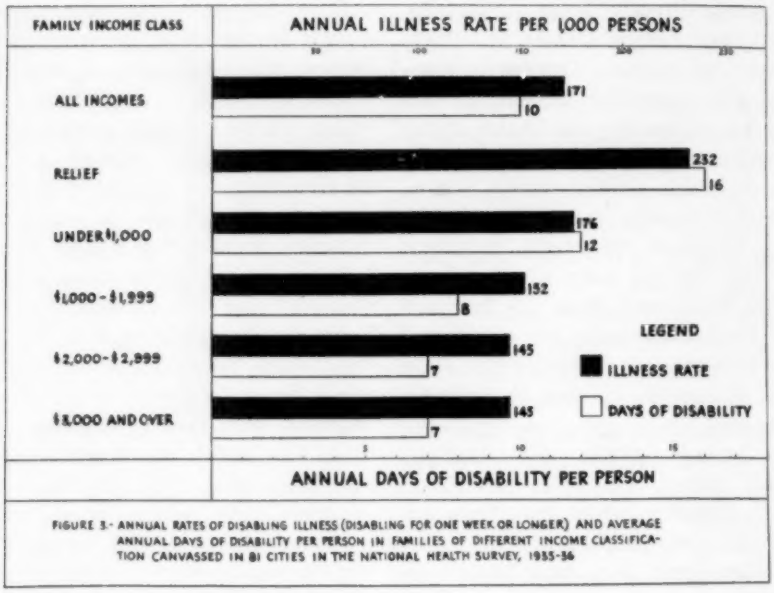

FIGURE 3.- ANNUAL RATES OF DISABLING ILLNESS (DISABLING FOR ONE WEEK OR LONGER) AND AVERAGE ANNUAL DAYS OF DISABILITY PER PERSON IN FAMILIES OF DIFFERENT INCOME CLASSIFICATION CANVASSED IN 81 CITIES IN THE NATIONAL HEALTH SURVEY, 1935-36

the main, the causes of illness are quite different from the causes of mortality. If case incidence is used as the unit of measurement, the ten most important illnesses [2] assume positions which may be noted in Figure 2. Upper respiratory infections lead by a wide margin; accidents constitute a potent cause of disability and so do stomach troubles. For a long time diarrhea was the only one of the group to arrest attention in public health programs. In some areas efforts are now being made to combine actual care at confinement with maternity hygiene service.

An appraisal of health department programs made on the basis of measures designed to affect diseases and conditions causing the greatest amount of illness discloses deficiencies even more glaring than the one based on mortality experience. In both instances, however, most of the neglected conditions are not in the so-called acute communicable groups and because of this characteristic they have been considered beyond the purview of public health agencies up to the present time.

Even under theoretically ideal conditions where all acceptable preventive measures in programs of health might be taken, a certain amount of illness requiring medical care will occur. Its severity and consequences can be reduced by appropriate care. The magnitude of the prevailing illness burden as well as its differential distribution in respect to income groups of the population [3] may be noted in Figure 3. Especially the families on relief and those with annual incomes below $2,000 are afflicted most severely, irrespective of whether incidence or duration of illness be taken as the criterion. Other data [4] accumulated by the Public Health Service but not presented on this occasion show that the amount of care which people receive is inversely proportionate to their income. Restorative measures must not be regarded as mere patchwork. Good medical care not only saves life but it also is a means of lessening disability which follows neglected illness. Social programs, especially of the assistance type undertaken on a broad scale within the past few years, have increased awareness of the rôle which illness plays in the

causation of disability and dependency. The course of events makes it quite clear that society is preparing to organize for health in a broad way as it has already done for other purposes. Especially health administrators must contemplate how their departments may serve the public interest in this area of social action. Apparently they are poorly prepared at the present time to accept enlarged responsibilities.

In connection with the National Health Inventory the total public health structure of the 94 study counties as expressed by organized agencies was examined from several points of view. Parenthetically it may be added that most of these counties contained larger centers of population; hence they are distinctly above the average in respect to number of inhabitants and per capita wealth. Despite the favorable position of these counties from the standpoint of resources, their expenditures for the limited services commonly assigned to organized health agencies were surprisingly low. For the group of counties as a whole, the annual per capita expenditure by all agencies, both official and nonofficial, was $.86; of this amount $.52 was contributed by the health department, $.11 by other official agencies, and $.23 by voluntary agencies.[5] Another body of data, assembled in this instance by the Division of Domestic Quarantine, U. S. Public Health Service, reveals even smaller outlays per person. The data include reports from approximately 600 counties affording through use of public funds some type of health department service, each county operating as a separate unit. Within these 600 counties, usually small in population, the median annual expenditure by health departments is but $.42 per capita. Obviously such low expenditures are not sufficient to permit reasonable development of the limited preventive services ordinarily encompassed by the usual program of health agencies.

The extent to which special clinics have been developed has become a rather critical index for judging the

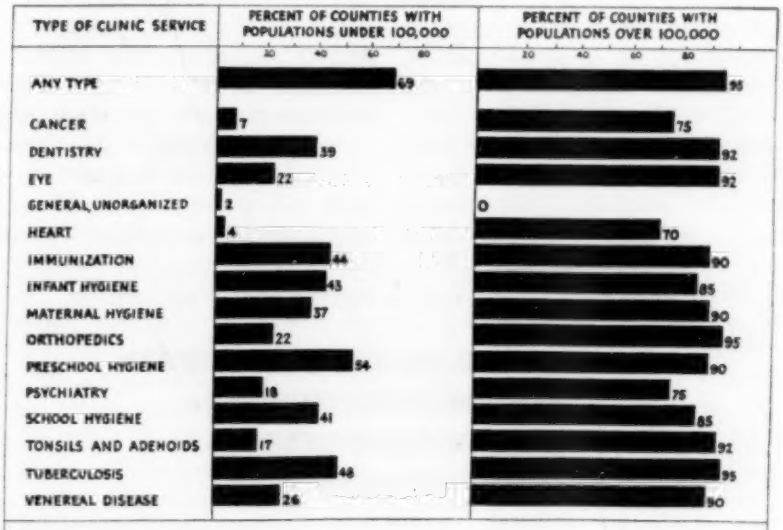

FIGURE 4.-PROPORTION OF SURVEYED COUNTIES IN DIFFERENT POPULATION GROUPS WHICH REPORTED PROVISION OF SELECTED TYPES OF CLINIC SERVICE

availability of preventive services. On this point the National Health Inventory disclosed some rather pertinent information for the 94 study counties [6] which is presented in Figure 4. Opportunity for obtaining service of some type in a clinic classed as preventive is afforded in 70 per cent or more of the populous counties. In the group of counties having less than 100,000 inhabitants the presence of clinics is reported far less frequently. Here especially the variety of clinic service is restricted. Cancer and heart disease appear to be neglected more than other conditions in the scheme of clinic organization.

Another measure of opportunity for treatment outside the home lies in the existence and distribution of out-patient departments. According to a recent survey, there are about 770 organized departments attached to general and special hospitals, exclusive of federal, institutional, and proprietary hospitals.[7] Roughly three-fourths of the existing departments are controlled by nonprofit bodies; the remainder by state and local governments. Like special preventive clinics, out-patient departments are concentrated in populous areas, especially in large cities of the northern and middle Atlantic seaboard and of the Great Lakes area. One hundred per cent of the cities with 250,000 or more inhabitants contain at least one out-patient department, while only 2 per cent of the cities with less than 10,000 population have one or more such departments. Inasmuch as two-thirds of the aggregate hospitals owned by state and local governments and four-fifths of those operated by nonprofit bodies do not maintain organized out-patient departments, there is obviously possibility for expansion of services to ambulatory patients, especially to those of the indigent and marginal income classes whom out-patient departments are primarily designed to aid.

Since the hospital is coming to be regarded as a public health facility, it is encumbent on health administrators to learn the criteria by which to judge the adequacy and availability of hospital accommodations. On this point inquiries made by the Public Health Service show very clearly that primary consideration should be given to the scheme of financial support. Until the bed-days of care in free and part-pay categories bear a reasonable relationship to the income distribution of the population, estimates on available beds and percentage of beds occupied cannot be taken to express potential demand for hospital service. Data presented in Figure 5 substantiate this point.[8] Hospitals that derive 50 per cent or more of their income from patients may expect their beds to be unoccupied about half the time. Obviously the mere existence of a hospital in a community is not a satisfactory criterion for judging the adequacy

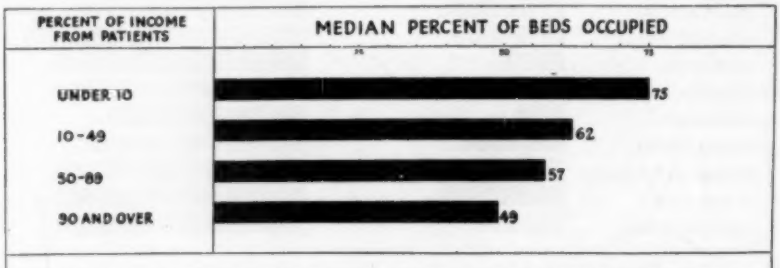

FIGURE 5.- MEDIAN PERCENTAGE OF BEDS OCCUPIED IN GENERAL AND ALLIED SPECIAL HOSPITALS CLASSIFIED ACCORDING TO PROPORTION OF INCOME FROM PATIENTS

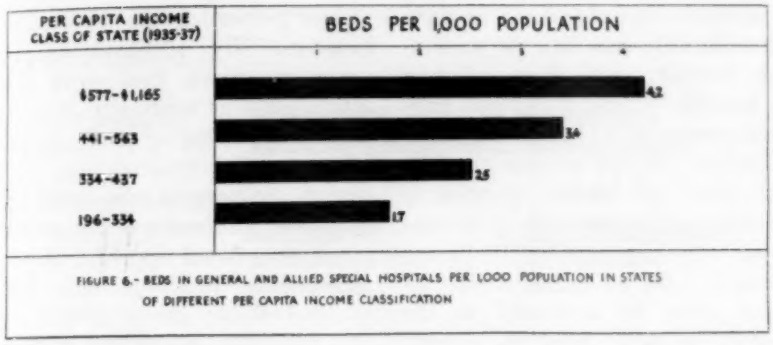

FIGURE 6.- BEDS IN GENERAL AND ALLIED SPECIAL HOSPITALS PER 1,000 POPULATION IN STATES OF DIFFERENT PER CAPITA INCOME CLASSIFICATION

or availability of a service. For a significant part of the population all charges must be remitted and for others rates must be geared to income of patients. Since a very large proportion of hospitals derive most of their income from patients, the distribution of hospitals as shown [9] in Figure 6 should be no cause for surprise. In states where per capita income [10] is lowest hospital accommodations are fewest despite the well known fact that low-income groups have the highest illness experience.

Nutritional advice may be cited as another type of service often rendered without specificity and without taking into account the realities of income. Health department workers in the nutritional field almost invariably tell their clients to drink more milk and eat more vegetables. As maxims these no doubt are more generally applicable than any others that might be substituted. The diets of families with greatly restricted incomes are generally supposed to be characterized by excess of calories and deficiency of vitamin and mineral content. A study by Wiehl and Palmer [11] of the summer diets of 600 selected poor families, however, leads to the conclusion that many families on relief or with very low incomes subsist on diets deficient also in energy value. In view of the very large percentage of the families who occupy the low income brackets one may ponder these points: How well suited is standardized advice to the budget of the individual family? What specific nutritional defects do the proposed diets seek to correct? What curtailment of general food value in the family diet may result from the purchase of the proposed articles which are relatively expensive? It is hoped that the studies now in progress under the auspices of the Public Health Service and other agencies will enable the field worker to speak with greater assurance and specificity than is possible at the present time. Briefly, these studies are designed to appraise the various physical measurements together with the several chemical and biological tests applicable to human beings that are presumed to be of value in determining true metabolic deficiencies. By correlating these findings with food intake, it is hoped that more light may be thrown on the true effects of diet in relation to growth and development.

In the whole lexicon of public health perhaps no word is more often misapplied than "education." It is even alleged by some enthusiasts that all public health effort is basically education. Critics of actual practice have little difficulty in pointing out that much of the day-to-day activities of public health workers would not come within a very liberal definition of the term education. This should be no source of surprise since most of the personnel employed in health agencies

were trained to render a form of service that ordinarily has little or no educational content; yet these workers assume the rôle of educators upon finding employment in a health organization. Even if one may concede that the material used by health agencies is scientifically correct, the process of education has only begun when the person is informed. The recipient of this information must be activated to the point where he will follow the correct course irrespective of the inconvenience that may be entailed. It would therefore be well for the public health profession to apply to their educational efforts the criteria commonly used in evaluating the procedures designed to influence human conduct.

Those among the present generation who were inducted into public health work when Sedgwick reigned supreme regret the rather low position that is now accorded the routine sanitation activities of health departments. In large measure this fall from high esteem results from the fact that later day workers in this field pay less attention to biological principles on which sanitation should be based than did their forebears. Too much of current activity represents little more than rituals that have been solidified in codes and made impressive by gadgets. Up to now the more significant contributions of sanitation have been in the control of intestinal infections and infestations. Air-borne diseases, and some of virus origin, may yet be influenced by environmental measures. The effect of environment on physiological processes is appreciated but very poorly understood.

No doubt many of the administrative problems involving procedures on which questions may be raised, as well as the needs that remain unsatisfied, would have been resolved had the public health field been able to attract and retain a sufficient complement of personnel possessing the necessary qualifications. By qualifications is meant something more than mere scholastic attainments as expressed in credits and degrees. Occupying positions as health officers and bureau chiefs, we should like to see persons who combine sound judgment, professional competence, and strong emotional appeal. Most of the subordinate positions call for independent work; hence central direction and planning, no matter how well organized, can never be substituted for individual ability in the ranks. The building and maintenance of a suitable staff is a never-ending job. Induction, development, and replacement must go on simultaneously. That relatively few governments carry out even the first step in a systematic manner is illustrated in Figure 7.[12]

Only one-third of the states and under two-thirds of the cities with populations of 10,000 or over on which data were assembled by the Public Health Service employ any persons under a merit system. Personnel is selected by interview in roughly one-third of the jurisdictions; it is selected by examination in one-third of the states and in over one-half of the cities. Promotion is based on administrative discretion entirely or some scheme involving it as one of several factors in three-fifths of the states and two-fifths of the cities. Needless to say, such policies scarcely conduce to long tenure or security.

The situation among counties is not so clearly defined or so easily described as that for states and for cities. Inasmuch as state departments exert considerable financial and policy control over county departments, there results in effect a continuing effort toward a degree of conformity, not to say uniformity, of practice, that operates to stabilize the local departments. Literally, state departments require more systematic personnel procedure of

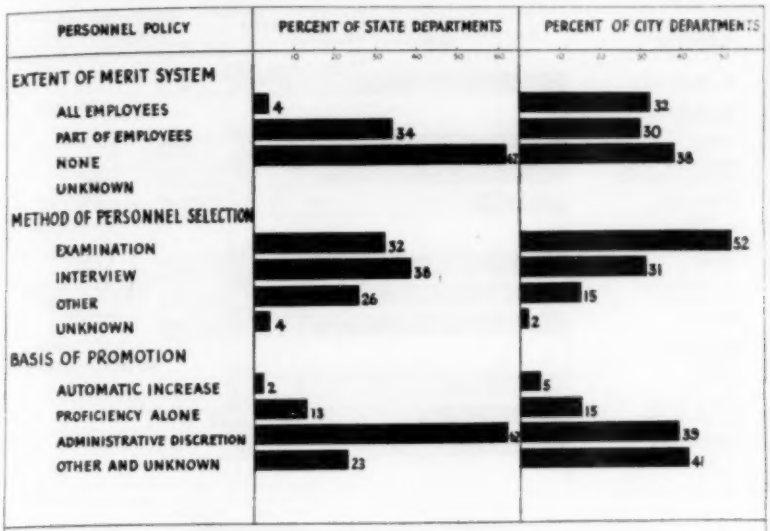

FIGURE 7.- PERCENTAGE DISTRIBUTION OF STATE AND CITY HEALTH DEPARTMENTS ACCORDING TO EXTENT OF MERIT SYSTEM, METHOD OF PERSONNEL SELECTION, AND BASIS OF PROMOTION

counties than they themselves show. While civil service and merit systems as such on a county basis are almost nonexistent, the professional character of the employers, as evidenced by tenure and training, is well above the average for all departments encompassed by the study. Aside from the influence on personnel policy that is exerted indirectly by the state health agency, through one device or another, counties and the smaller cities especially seem remiss in making necessary legal provisions for selection and advancement on a merit basis. As to retirement allowances, state and local governments have always been notoriously negligent.

By studying the employment record of health officers, one finds that a median of 3.4 represents years of employment for all full-time health officers listed in directories published by the Public Health Service during the period 1912–1935.[13] With such frequent turn-over, the problem of training represents a rather discouraging task. It is a source of gratification, however, to note that professionalization as expressed by length of full-time employment has gone on to a greater extent among staff employees than among chief administrators. As a result perhaps of the fact that large cities were first to develop full-time staffs of appreciable size, personnel in these political subdivisions show longer periods of service than obtain in either state or county organizations.

Despite the lack of legal provisions for security which characterizes public health positions, some encouragement may be found in the fact that slightly more than half of the aggregate full-time medical, nursing, and sanitation personnel in official agencies have attempted to equip themselves for their jobs by obtaining some type of instruction in their chosen work.[14] It is true, however, that only one-third of those with training have attended what may be described as formal organized courses in public health work; the remainder of this group have received only field training, usually in the form of special courses of short duration.

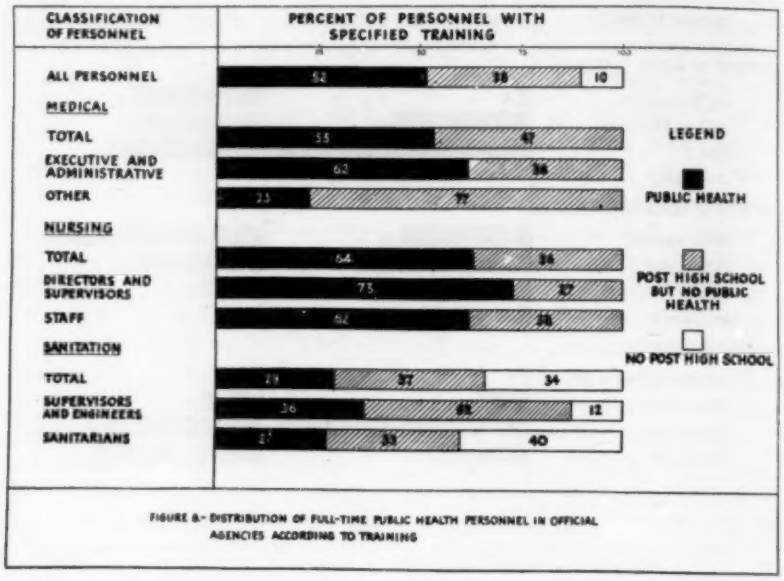

FIGURE 8.- DISTRIBUTION OF FULL-TIME PUBLIC HEALTH PERSONNEL IN OFFICIAL AGENCIES ACCORDING TO TRAINING

These points are illustrated in Figure 8.

From the standpoint of formal public health education, physicians take precedence, as 30 per cent of them report such training. Somewhat fewer have attended special or field courses; nearly one-half are without scheduled training. In contrast, only 20 per cent of the nurses have received formal instruction, but a much larger percentage have participated in special courses, so that only slightly more than one-third are without particular training. Sanitarians show least specialized preparation in that 71 per cent have failed to take either formal or special courses; 5 per cent possess formal training; and the rest have some measure of less systematic preparation. In the instance of each class of personnel—medical, nursing, and sanitation—a higher percentage of executives and supervisors than of staff members have received both formal and field instruction.

If the three classes as a whole are broken down by types of jurisdiction, county and district health department employees show substantially more specialized training than either city or state employees. Almost two-thirds of all county employees are shown to have more than basic training, but only two-fifths of city and about one-half of state employees are so equipped. The outstanding groups, each of which shows over 70 per cent of its members with either formal or field public health training, are county health officers (71.7 per cent) and county nurses (71.7 per cent). State nurses, as a group, follow with 65 per cent thus trained.

The fact that certain classes of personnel have received either formal or field training gains significance when associated with the amount of time devoted to the various courses. Measurement of the duration of special courses is not attempted in this analysis since it is impossible to determine the intensity of such courses. In Figure 9 is given the distribution of formally trained personnel according to the periods spent in study. Obviously 1 year is the interval most commonly spent in special preparation since 54 per cent of all trained employees have devoted this period to additional study.

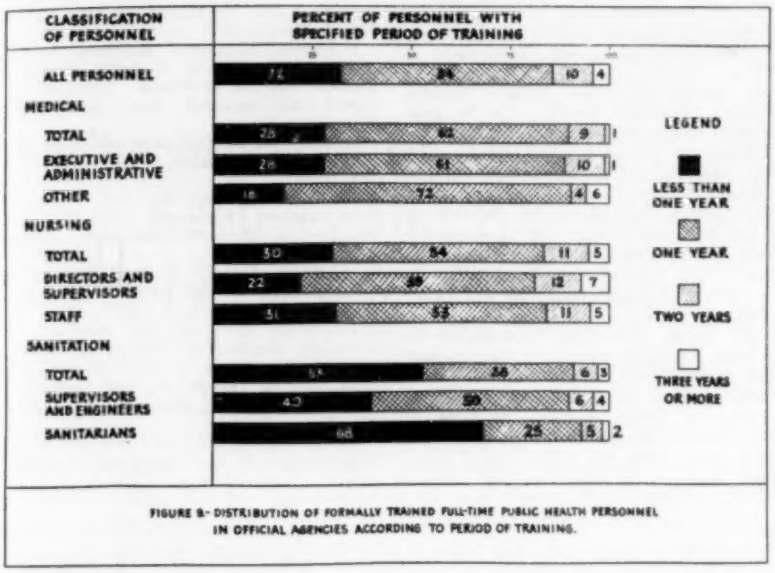

FIGURE 8.- DISTRIBUTION OF FORMALLY TRAINED FULL-TIME PUBLIC HEALTH PERSONNEL IN OFFICIAL AGENCIES ACCORDING TO PERIOD OF TRAINING.

In one respect nurses are better equipped for their work than are either physicians or sanitarians, for 16 per cent have received 2 or more years of formal public health training as opposed to 10 per cent of the physicians and 8 per cent of the sanitarians. On the other hand, 30 per cent of the nurses have received less than 1 year of formal instruction, a figure slightly above that for medical personnel. With the possible exception of the medical class, employees serving in executive and supervisory positions have secured more prolonged training than have staff employees.

This paper, by design, has been somewhat broad and discursive in its coverage. In some respects it may be considered a departure from the main theme of this symposium—"Evaluation of Public Health Procedure." The broad subject "Orientation" was chosen because public health is dominated by the specialized groups within its ranks, who are concerned primarily with promoting their interests and perfecting their technics. Within limits this influence is desirable but there results a tendency to miss the forest because of the trees. Especially in these days of changing social concepts and rapid development among all the sciences, it seems that we should pause for a moment now and then and pose for ourselves this rather colloquial question: Where are we and where do we go from here? That the people want health and are expressing a willingness to pay for it is evident. If the movement is to go forward under the banner of those agencies which bear the title "Department of Health," administrators must face some rather fundamental issues. These may be stated very briefly: How well suited is the orthodox program of health departments to the needs of the people? What rôle is the department willing to occupy in areas beyond its traditional interest? How well equipped are public health groups to carry such additional functions as they may be called upon to discharge? This paper represents an attempt to set up a few bench-marks for purposes of orientation and to suggest criteria for determining progress in selected fields, some of which are now occupied, others of which need to be explored.

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Cross Purposes

AN unidentified newspaper clipping, presumably from a Philadelphia newspaper, carries the interesting information that a Philadelphia hospital and an antivivisection organization each received $5,000 under the will of a woman who also bequeathed $1,000 to a dog and cat hospital. This is an ironical comment on what was undoubtedly a totally unintended result of these bequests, namely that one of them will be used to defeat the purposes of the other two. The bequest to the hospital and to the dog and cat hospital will be used for the treatment of human beings and animals suffering from disease. This treatment will be preceded by diagnosis based on knowledge obtained from animal experimentation. It will include methods of treatment, both medical and surgical, based on animal experimentation. Even the well chosen diets which will adorn the trays of the human patients and the rations which will restore ailing animals to their owners in prime condition are computed on the basis of information depending in large part on animal experimentation. The bequest to the antivivisection society will be used to cripple, harass, and defeat the efforts of scientists to use animals in the investigation of the remaining problems and mysteries in the field of health and disease. Thus unconsciously this testator has made one bequest which will neutralize and set at naught the effects of another.—*J.A.M.A.*, Aug. 19, 1939, p. 684.

The Problem of Maternity—A Survey and Forecast*

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THE problem of safeguarding maternity is an old one but the program which has been developed specifically to control the situation is, in this country at least, of recent origin. Quite a number of us, I am sure, participated in the early steps which were taken about 25 years ago. Many of us have seen the several stages in the development of a program which is now nation-wide and which has every earmark of being successful. While the accomplishments to date have not been startling, as in the campaign against tuberculosis, typhoid fever, or diphtheria, they have, nevertheless, been noteworthy and encouraging. We can now safely say that we have learned how to overcome what only recently looked like a serious deficiency in our medical practice. It is necessary only to make available more generally services which have proved effective.

For a long time the high maternal death rate of American women was nothing short of a disgrace. Everyone seemed to be conscious of the situation and deplored it. In the effort to enlist public support for the movement to reduce the hazards of childbearing, it was a common practice to show the maternal mortality rate of a long list of countries with the United States always appearing at the bottom of the list or close to it. Only Chile and a few other countries of notoriously low medical standards showed conditions as bad or worse. The actual figure recorded was 7 maternal deaths per 1,000 live births in the states for which reliable data were then available. Special studies of underprivileged groups showed much higher figures—10 per 1,000 and even more in congested urban areas. In contrast, there were the Netherlands and the Scandinavian countries with maternal mortality rates under 3 per 1,000 live births. How did these countries with no better medical facilities, and with certainly no higher standards of life than our own, provide protection and services for their women which consistently produced maternal death rates less than one-half ours? That was the challenge.

Here certainly was an opportunity for the launching of a public health campaign which would win wide support. The Children's Bureau, established in 1912, took leadership in the movement, but with limited funds and no administrative authority accomplished relatively little in its early years beyond the publication of several studies and the distribution of minimum standards. It was not until the passage of the Sheppard-Towner Act in November, 1921, that an effective na-

* Presented at the American Congress on Obstetrics and Gynecology, Cleveland, Ohio, September 13, 1939.

tional movement was inaugurated. This legislation provided several million dollars of federal funds between 1922 and 1929 to those states willing to make necessary supplementary appropriations for maternity and infant welfare activities. The Act called for the establishment in each state of a responsible administrative agency, usually a child hygiene bureau. In this way standards of prenatal care formulated by the Children's Bureau were incorporated in the practice in the various states.

Even before the passage of the Act, many states had created maternity and child hygiene bureaus. At the beginning of 1921, 33 such state agencies were already in existence. By 1929 when the Act expired, maternity and child hygiene bureaus had been created in virtually every state in the Union. According to state reports, in the last 4 years alone more than 4,000,000 infants and preschool children, and about 700,000 expectant mothers were reached by some form of maternity and infancy work. It was thus primarily through federal activity that nation-wide interest was aroused in the welfare of mothers and babies, that large numbers of women received instruction in maternal and child hygiene, that public health nurses were appointed in large numbers to render services in the homes of pregnant women, and that steps were taken to reduce the menace of the inefficient and unclean midwife through registration, supervision, and instruction.

But from the very beginning there was the pressing need for a decisive demonstration of how best to organize a local effort to control the unnecessary maternal and infant tragedies. This object lesson in life conservation was the contribution of the Maternity Center Association of New York. This Association, organized in 1918 by a particularly able and determined group of women, soon became a militant and effective center of service and propaganda. Frances Perkins was the first executive secretary and Mabel Choate, as president, provided the leadership. From its inception this association included a number of New York obstetricians, leaders in their field, who gave authority and direction to the plans. This is an appropriate time and place to record the unremitting labors of the late Dr. Ralph W. Lobenstine, the first chairman of the Medical Board of the Maternity Center Association, who watched and guided every step in the development of a sound program. This New York association and similar ones which have been organized since in other parts of the country are truly Dr. Lobenstine's monument.

The function of these Maternity Center Associations was first to develop a sound public opinion which would demand correction of the existing evils; second, to organize a local service which would demonstrate that safe maternity care could be made available to large numbers of women at a reasonable cost, and third, that such services could readily be extended to cover sizable areas of the population. The nucleus around which the service was developed was a local public health nursing group operating under close medical supervision in the homes of their clients and in clinics. While a few of the nursing leaders had acquired specialized training, the majority of the rank and file perfected their routine as they worked; for the art of prenatal nursing was still very young. They visited mothers at home and helped prepare them mentally and physically for labor and delivery. The nurses took blood pressure, temperature, and pulse readings, made urinalyses, watched for all the danger signs, listened to the fetal heart, checked on dental care, diet, rest, and the other essentials to healthful living. At the same time, the nurses concerned themselves with such conditions as poor

housing and family maladjustments, which interfered with the mother's peace of mind.

I was associated with this movement in New York City from the beginning, and I prepared with the assistance of the then director, Anne A. Stevens, the first study of the results which were achieved by the Maternity Center Association. The association provided, for the most part, only prenatal nursing care for its clients. The results were distinctly useful and encouraging. The intensive follow-up of the women through urinalysis and medical examination and subsequent advice reduced the number of maternal deaths from albuminuria and convulsions to one-third the usual number. Prenatal care was obviously effective in reducing the toxemias of pregnancy. This effort likewise reduced the number of infant deaths from prematurity by two-thirds and the number of stillbirths by about one-half.

The results were obviously good and were enthusiastically received as a great achievement. But on further analysis distinct limitations were found. Our study showed that deaths of mothers from causes other than toxemia had not been favorably affected. Deaths from the accidents of pregnancy and of labor, and from puerperal hemorrhage remained about the same as in the general population. Apart from prematurity, the hazards that affected babies during the first month of life were pretty much the same as in the population at large. One of the shocking results of our study of this experience was the very high mortality of mothers cared for by the association during pregnancy but delivered in some of the New York City hospitals, the rate being 11 per 1,000, or about twice that prevailing in the general population. Of the hospitalized cases, half of the deaths were due to septicemia. This study reflected the inadequacy of the care given to women during and after labor in some hospitals in the city and proved, if further proof were necessary, that the program of the Maternity Center Association had been too narrowly conceived. Supervision of pregnancy was obviously of value, but in itself was not sufficient to safeguard the life of the mother and baby. Of equal, or even greater importance, was the preparation and supervision of the confinement and the postpartum care of the mother and child.

In 1922 the Maternity Center Association offered to the mothers under its care in the demonstration area medical and nursing supervision, instruction during pregnancy, help in arranging for delivery, nursing assistance at time of delivery, nursing supervision and instruction during the postpartum period, postpartum medical examination, and help in arranging medical supervision for the baby and further care for the mother when necessary. Each mother was urged to register as early as possible in pregnancy with the doctor or hospital physician who would deliver her. This was clearly a well rounded program intended to cover the entire maternity cycle and to supplement the existing medical and hospital facilities for delivery care. Fortunately a sizable group of women in the Demonstration Area took advantage of this service.

A new study of the results for the years 1922 to 1929 [1] which I made in 1930 in collaboration with Hazel Corbin, Director of the Maternity Center Association, showed clearly that the care provided by the association reduced the mortality of mothers to about one-third of that among women in the control group. Deaths from eclampsia were entirely eliminated, those from sepsis greatly reduced, and the remaining few fatalities were, in the judgment of the Medical Board, unpreventable in

character. Stillbirths were 42 per cent lower, and infant deaths in the first month of life were reduced 32 per cent. I studied the records of the Frontier Nursing Service inaugurated by Mary Breckenridge in the difficult areas of the hills of Kentucky. The results were even more striking in terms of maternal lives saved through good nursing and skilled obstetric care as rendered by nurse midwives. On the basis of these demonstrations we were entirely justified in our claims that the lives of 10,000 women could be saved annually; that about 40,000 stillbirths could be prevented, and that some 30,000 infants who died under 1 month of age could be kept alive provided similar services and results were general for the women of the country.

While these maternity demonstrations were being developed in New York and in other large centers of the country, there was also an increasing awareness on the part of the medical profession that the woman in pregnancy and at confinement needed a larger measure of supervision and expert care than she was generally receiving. The profession now realized that the training of the average practitioner, and certainly that of the average midwife who were caring for the great majority of the confinements in this country was woefully inadequate. Special investigations were launched to determine in detail the circumstances under which women died in maternity, and to place more definite responsibility for these fatalities. The first comprehensive investigation was that planned and supervised by the members of the Obstetric Advisory Committee of the Children's Bureau. It covered an area of 15 states and the period was 1927 and 1928.[2] The facts revealed by this study led inescapably to the conclusion that maternal deaths were due in large part to controllable causes. The recommendations drafted by the Advisory Committee on Obstetrics advocated that physicians assume leadership in the program for control and that the general public be educated regarding the need for and meaning of adequate maternal care.

Perhaps more dramatic and significant in its nation-wide influence on the medical profession was a study begun in 1930 by the New York Academy of Medicine.[3] This investigation covered a 3 year period and was extremely well organized by the leading obstetricians and gynecologists of New York to determine responsibility for each maternal death reported during the period. Every fatality due to a puerperal condition was investigated by personal interview with those connected with the case. The hospital records were studied at first hand. The evidence was carefully analyzed by expert committees, and all cases were assigned specifically to either preventable or non-preventable causes as the evidence indicated.

The investigation showed that two-thirds of all the deaths studied could have been prevented if the care of the woman had been proper in all respects, a finding which tallied remarkably well with that obtained by the Maternity Center Association and other groups in their preventive demonstrations. The study, as you all know, revealed a number of shocking conditions surrounding the care of childbearing women. Prenatal care was too often inadequate and improper. Operative interference during labor was resorted to in too many instances. Often the operation chosen was the wrong one, undertaken inopportunely, and demanded greater training and skill than the attendant could command. Such was the objective judgment of the most skilled men of the profession on the evidence before them.

Sixty per cent of all the preventable deaths were traceable to some incapacity in the attendant—lack of skill,

lack of judgment, or careless inattention to the demands of the case. Some of the fatalities grew out of the fact that internes had too wide a field of independent activity. The investigation in addition showed that more than one-third of all preventable deaths were due to some failure on the part of the patient herself to take advantage of the facilities which are at hand for safeguarding her in the period of gestation and lying-in.

Hospital standards were inadequate in many instances. Proper facilities for labor and delivery were lacking, isolation was not always carried out promptly. In some proprietary hospitals, the operating room was also used as a delivery room. In some hospitals the resident staff was given too great responsibility. Exacting and difficult obstetrical operations were being performed by the junior members of attending staffs without consultation with their chiefs.

It was clear from this and from other investigations that both medical personnel and facilities were generally inadequate to insure safe maternity. For the national welfare it was necessary that better obstetrical training be given in the medical schools and in hospitals to qualify the rank and file of general practitioners; that specialists be designated only after adequate graduate study; that the nursing personnel and midwives receive more specialized training; that obstetric hospitals be architecturally segregated from the other services, and that in such hospitals operative procedure be more adequately supervised to assure necessary skill in those taking responsibility. Emphasis was placed on the need of full records as the basis of frequent and regular conference by the staff to determine the causes for failure.

But it takes time to set up facilities for the adequate care and supervision of women during pregnancy and in their confinement in a country as large as ours. In spite of all the undoubted efforts of the medical profession and of the many groups of lay workers, public health nursing organizations and others, there was a long lag before the death rate from puerperal causes responded favorably. Even as late as 1930 the maternal mortality rate in this country was 6.7 per 1,000 live births, or only slightly less than the maximum of the earlier years. But since that year the mortality from puerperal causes has declined, at first slowly and later more rapidly and without interruption. By 1937 maternal deaths had already been reduced to 4.9 per 1,000 live births, a figure 27 per cent below that for 1930. Moreover, there is every reason to believe that when the rate for 1938 becomes available for the country as a whole, a further drop will be evident, almost to the point of 4 per 1,000 live births. Thus far in 1939 the same tendency is in evidence. In New York City and New York State, the figures for 1938 were 3.7 and 3.5 respectively. I am inclined to believe that a decline in the rate of about 10 per cent per annum is now prevailing generally over the country.

On further analysis we find that the decline in the maternal mortality rate reflects an increasing control over each of the major hazards of childbirth. The mortality for puerperal albuminuria and convulsions has dropped no less than 39.5 per cent between 1930 and 1937. For puerperal septicemia the rate per 1,000 live births has declined from 1.50 in 1930 to 0.95 in 1937, or 36.7 per cent. In the corresponding period, deaths from puerperal hemorrhage have been reduced by 14.5 per cent. Even deaths from abortion with septic conditions, which increased between 1930 and 1935, registered a substantially lower figure in 1937 than in 1930. (See Table 1.)

It appears then, from this brief

TABLE 1

NUMBER OF DEATHS PER 1,000 LIVE BIRTHS FROM PUERPERAL CAUSES, UNITED STATES 1930–1937

Cause of Death	*1937*	*1936*	*1935*	*1934*	*1933*	*1932*	*1931*	*1930*
The Puerperal State	4.88	5.68	5.82	5.93	6.19	6.32	6.60	6.73
Abortion with septic conditions	0.69	0.83	1.00	1.01	0.97	0.97	0.96	0.88
Abortion without mention of septic condition (to include hemorrhage)	0.26	0.31	0.27	0.26	0.30	0.34	0.30	0.30
Ectopic gestation	0.20	0.22	0.25	0.26	0.29	0.27	0.27	0.26
With septic condition specified	0.03	0.04	0.04	0.04	0.05	0.04	0.05	0.04
Without mention of septic condition	0.17	0.17	0.20	0.21	0.23	0.22	0.22	0.22
Other accidents of pregnancy (not to include hemorrhage)	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.07
Puerperal hemorrhage	0.59	0.65	0.63	0.64	0.64	0.66	0.68	0.69
Puerperal septicemia (not specified as due to abortion)	0.95	1.26	1.34	1.29	1.31	1.31	1.49	1.50
Puerperal septicemia and pyemia	0.95	1.25	1.34	1.29	1.30	1.31	1.48	1.49
Puerperal tetanus	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Puerperal albuminuria and eclampsia	0.98	1.04	1.03	1.12	1.21	1.28	1.43	1.62
Other toxemias of pregnancy	0.25	0.25	0.23	0.25	0.25	0.23	0.25	0.22
Puerperal phlegmasia alba dolens, embolus, sudden death (not specified as septic)	0.22	0.26	0.26	0.25	0.28	0.30	0.29	0.31
Other accidents of childbirth	0.64	0.76	0.71	0.74	0.84	0.87	0.83	0.80
Other and unspecified conditions of the puerperal state	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02

(a) Less than .01 per 1,000 live births

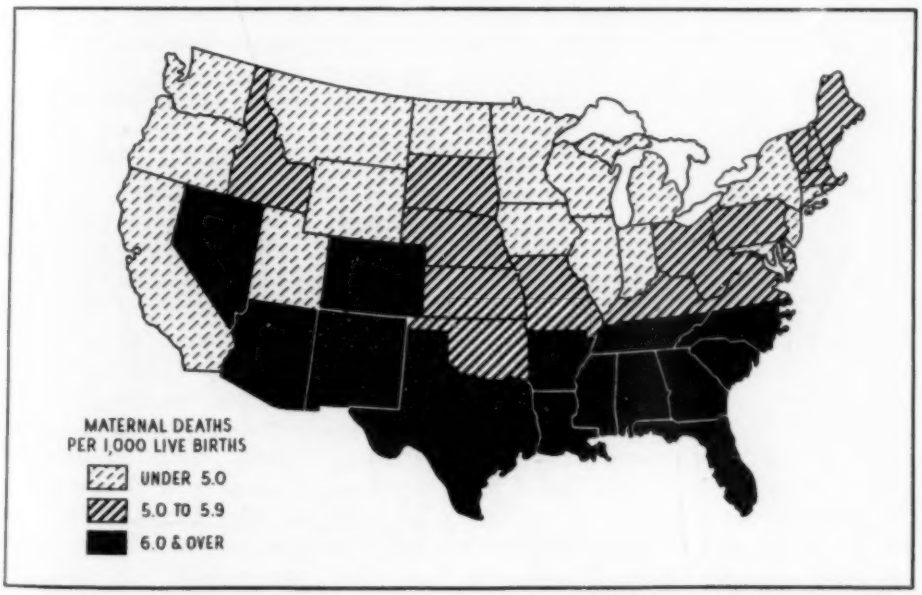
survey, that the movement for maternal welfare has finally come into its own. As we have already pointed out, many influences have been at work. This is a good occasion to pay our respects to the public health nursing organizations of the country which have played a major rôle in the development of the campaign to control maternal mortality. Public health nurses have been the instruments for carrying the message into the home, whether the work done was under the auspices of state and local health departments or by local maternity associations. In most areas it was the local visiting nurse association which took upon itself the responsibility for educating mothers in the community regarding approved practices in prenatal care and confinement. We cannot exaggerate the importance of this nation-wide service carried on by 20,000 public health nurses in every state of the Union, and extending down to the smallest geographical subdivision.

A good example of an agency operating through visiting nurses is the Metropolitan Life Insurance Company, which throughout this period has developed and made available a service to its policy holders to control unnecessary maternal deaths. At the very beginning of its welfare program in 1909, the company emphasized this phase of bedside nursing, and as the service grew to include a larger number of its policy holders, more and more emphasis was put on the care of mothers in pregnancy and postpartum. In some areas, such as Canada, more than half of all the nursing visits were concentrated on the care of the puerperal state. It is, therefore, interesting to observe what has occurred in this group of people, for the most part the wives of wage earners living in congested areas of cities. In 1911, the first year for which data are available, the puerperal mortality rate among the millions of industrial policy holders was 19.8 per 100,000 lives insured. In 1938, the figure had been reduced to 6.2, or a reduction of almost 70 per cent. During this period the birth rate, of course, likewise declined and it is,

therefore, necessary to convert these figures into corresponding maternal mortality rates per 1,000 live births. When this is done, we find that there were 7 maternal deaths per 1,000 in 1911, as compared with 3.5 in 1938. In general the decline among the insured has been very much like that in the general population, perhaps a little more accentuated because of the more intensive efforts concentrated on these women. It must be remembered that these represent a group whose mortality might be expected to be somewhat higher than that of the general population. It is very encouraging, furthermore, to point out that in the last few years the decline has been at its maximum, of the order of 10 per cent per annum. There is no indication as yet of any lessening in the velocity of the improvement.

Another major influence has been the activity of the medical profession in raising the standards of obstetrical practice on a large scale. The results of the earlier surveys were evidently heeded, and we find in many large and even small centers an improvement of local organization for supervising hospital service, as well as individual practitioners. Fortunately the trend the country over has been toward more and more confinements under medical auspices and more particularly in hospitals. Dr. S. C. Runnels, Secretary of the Hospital Obstetrical Society of Ohio, summarizing this phase of the problem recently [4] pointed out that the number of births in hospitals reporting to the American Medical Association has increased 46.5 per cent between 1934 and 1938, and, more important, that the increase has been entirely in the larger hospitals. Cases in hospitals handling more than 100 births a month increased 60 per cent; in those handling from 50 to 100 births, cases more than doubled.

GEOGRAPHIC VARIATION IN MATERNAL MORTALITY
UNITED STATES, 1935-1937



METROPOLITAN LIFE INSURANCE COMPANY

TABLE 2 — Maternal Deaths per 1,000 Live Births, Per cent of Live Births in Hospitals, and Per cent of Live Births Attended by Physician in White and Colored Population, by States, 1937.

State	Total				White			Colored		
	Birth Rates per 1,000 Population	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician	Maternal Deaths per 1,000 Live Births	Percent of Births in Hospitals*	Percent of Births Attended by Physician
United States	17.0	4.9	44.8	89.4	4.4	48.2	95.5	8.6	13.7	39.2
Alabama	21.3	6.3	12.7	64.8	5.5	17.0	88.6	7.6	5.7	26.0
Arizona	25.5	5.4	40.0	89.1	3.9	40.6	91.1	16.1	35.6	75.1
Arkansas	17.2	6.8	8.6	72.4	5.8	11.2	89.8	10.0	.6	18.8
California	15.3	4.1	78.2	98.4	4.0	79.3	99.0	5.8	55.1	87.0
Colorado	18.3	5.4	49.6	98.4	5.2	49.6	98.4	17.5	50.7	98.6
Connecticut	13.1	2.5	82.7	98.4	2.4	83.0	98.4	8.1	73.4	97.9
Delaware	16.7	3.9	57.4	87.0	2.7	63.2	94.4	10.0	27.1	48.3
Dist. of Columbia	19.7	5.8	88.6	99.9	3.9	95.0	99.9	9.6	75.5	99.9
Florida	17.7	6.8	32.3	70.2	5.3	42.7	90.2	10.3	8.4	24.2
Georgia	20.8	7.4	18.7	61.9	6.4	24.1	87.5	8.9	10.8	24.1
Idaho	21.0	4.5	48.4	99.5	4.6	48.4	99.5	-	50.6	97.7
Illinois	14.6	3.9	65.5	99.0	3.8	65.9	99.0	5.5	57.6	99.1
Indiana	16.1	3.5	39.6	99.6	3.3	39.9	99.6	7.7	28.1	98.7
Iowa	16.5	4.5	44.1	99.9	4.5	44.0	99.9	3.3	55.6	99.7
Kansas	15.7	4.3	40.9	99.6	4.1	41.5	99.7	10.1	23.8	97.9
Kentucky	19.2	4.7	12.3	80.2	4.7	12.0	79.6	4.8	18.2	89.0
Louisiana	21.6	7.2	27.5	62.0	5.9	32.4	83.5	8.9	20.7	32.7
Maine	17.8	6.6	37.0	100.0	6.6	37.0	100.0	-	30.8	100.0
Maryland	16.5	4.2	47.1	90.9	3.7	50.8	95.9	6.2	33.8	72.9
Massachusetts	13.9	4.6	76.6	99.6	4.6	76.8	99.6	8.4	66.6	96.6
Michigan	19.0	3.6	49.9	99.2	3.5	49.8	99.2	7.2	52.9	97.6
Minnesota	18.1	3.1	56.9	97.3	3.0	56.8	97.4	11.5	68.5	87.9
Mississippi	25.8	7.1	8.1	49.3	6.2	16.0	90.8	7.7	1.8	15.8
Missouri	14.2	5.1	38.8	95.8	5.0	37.4	96.1	7.4	60.0	90.4
Montana	19.0	3.7	62.4	97.2	3.8	62.2	98.0	3.1	65.4	85.2
Nebraska	16.3	4.1	40.0	99.9	4.0	39.7	99.9	10.3	59.5	99.3
Nevada	17.2	9.2	65.4	97.2	8.3	66.7	99.4	17.6	52.9	77.6
New Hampshire	15.0	4.5	26.8	99.8	4.5	26.8	99.8	-	20.0†	100.0
New Jersey	12.6	3.8	74.1	95.2	3.5	74.4	95.0	7.5	71.6	98.2
New Mexico	32.8	5.0	19.5	66.5	4.5	19.0	67.6	15.9	29.2	43.4
New York	14.3	4.0	79.8	98.2	3.8	79.7	98.2	8.0	81.1	97.6
North Carolina	22.6	5.4	15.5	72.6	4.2	20.1	89.6	7.9	5.8	36.8
North Dakota	17.9	4.7	43.4	92.4	4.6	42.5	92.6	6.4	66.7	87.1
Ohio	16.0	4.6	49.8	99.8	4.4	49.8	99.8	8.5	48.5	99.8
Oklahoma	16.3	5.2	25.9	95.1	4.7	26.0	97.5	9.9	24.9	72.2
Oregon	15.1	4.0	70.9	99.7	4.0	71.0	99.7	5.2	63.2	94.3
Pennsylvania	15.8	4.8	51.2	99.0	4.6	50.5	99.1	8.2	62.7	97.9
Rhode Island	15.0	3.8	68.8	98.4	3.7	68.6	98.4	7.0	76.6	97.2
South Carolina	21.7	7.7	11.6	52.4	5.6	20.6	89.1	9.7	3.2	17.7
South Dakota	17.2	4.0	40.4	96.5	3.7	40.2	97.6	10.2	43.7	75.6
Tennessee	18.0	6.1	20.4	87.2	5.3	19.8	90.8	10.5	23.8	67.4
Texas	18.8	5.7	29.3	82.8	5.0	31.0	87.6	10.9	16.8	47.6
Utah	24.5	3.3	55.4	98.3	3.3	55.4	98.4	6.8	61.0	93.8
Vermont	16.5	5.7	44.5	99.9	5.7	44.5	99.9	-	.0†	100.0
Virginia	19.2	5.4	20.0	72.8	3.8	25.2	87.2	9.4	7.6	37.7
Washington	15.1	4.6	75.6	99.3	4.3	76.4	99.7	12.0	46.5	83.9
West Virginia	22.6	5.0	12.5	93.9	4.9	12.9	93.6	7.4	5.4	97.8
Wisconsin	18.3	3.6	47.5	99.0	3.6	47.3	99.1	3.7	63.8	95.3
Wyoming	19.2	3.8	10.2	99.3	3.8	10.1	99.4	-	14.0	93.0

* Attended by Physician
† Based on less than 25 live births

On the other hand, confinements in hospitals caring for less than 13 cases a month showed a decrease of 14.4 per cent in this period.

That this factor of increasing care in hospitals is an important one in reducing maternal mortality is indicated by the definite and intimate relationship existing between the extent of hospitalization and maternal mortality. Generally speaking the states having the highest percentage of confinements in hospitals are those with the lowest maternal mortality. I have computed for white women the coefficient of correlation between maternal deaths and the per cent of births in hospitals for the 48 states. The figure is $-.39 \pm .12$ which indicates that the result is statistically significant. The correlation would be even higher were it not for the fact that large numbers of women are rushed to hospitals in serious condition with the hope of being saved. Thus hospitals are charged with deaths of mothers for which they have little or no responsibility.

Great as the improvement of recent years has been, there is still much to be done. The number of maternal deaths in the United States is even now about 10,000 per annum. Our country is still far behind many others in safeguarding maternity. Many women still come under care too late in pregnancy. Puerperal conditions continue to be among the leading causes of death for women in the childbearing ages. Between the ages 20 and 34, puerperal deaths are outranked only by tuberculosis. But the stage is set, as we have seen, for substantial and rapid improvement. It will be helpful in this connection to know where the problem is concentrated, among which groups of people, and in what areas of the country. That should help us to know where and how to concentrate our effort —to use the rifle rather than the shotgun, as has been our custom in the past to bring about effective results.

States vary enormously in the safety which they afford childbearing women. The maternal mortality rate in 1937 ranged from 2.5 per 1,000 live births in Connecticut to 9.2 in Nevada. Fifteen states recorded rates of 4 or less per 1,000 live births; 10 states, on the other hand, showed puerperal deaths in excess of 6 per 1,000 live births. The highest death rates are registered in the southern parts of the United States and more particularly in the southeast. In most of this large area of the country, where the birth rate is highest, the maternal death rate is still as high as the figure we deplored 25 years ago. This highly unfavorable experience is due, in large measure, to the high proportion of colored women giving birth in these states; for it is among the colored especially that the problem of maternity is still a serious one. For the United States as a whole in 1937, the puerperal mortality rate among the colored was 8.6 per 1,000 live births, or more than twice that for the white. Four states—Arkansas, Florida, Tennessee, and Texas—actually recorded maternal mortality rates among colored women of 10 or more per 1,000 live births. (See Table 2.)

I must not, however, give the false impression that the problem is now limited to a small area of the country or to one particular race. The fact is that needlessly high maternal mortality still exists very widely throughout the country and strikes various groups and races of people. The common factor, I believe, is low economic status, and particularly is this true in areas where good medical and hospital facilities are not available. This is not the time to review the statistical evidence upon which this conclusion is based. It is sufficient to say that the literature is fully convincing on that score. I do not mean to imply that we know all that we should with regard to the

effects of economic status of the family, the occupation of the mother, the type of care at confinement, and a number of other obviously important factors. Our records must be improved to enable us to make an analysis of these items on a national scale. But, generally speaking, we know that our future progress will depend upon the degree to which the newer type of medical, nursing, and hospital facilities is made available to the neglected areas and groups of people.

Personally I feel very confident that the current developments in the public health movement will carry us far and rapidly toward the goal of safeguarding maternity and infancy in our nation. Under the leadership of the federal and state health services and the various national voluntary health organizations, I can see a public more and more enlightened as to their needs and encouraged to demand the creation of the required facilities. The type of organizations and the character of the technics have been thoroughly developed in a large number of centers. These must be made more general, so that every section of the country is covered, the southeast as well as the northeast, in the service of the colored people as well as for those in the more privileged groups. The entry of the federal government into the picture is full of encouragement, for in this way the economic inequalities of the several parts of the country can and will be corrected. But even with facilities available, there will still be the problem of educating expectant mothers to take advantage of the care that is available. Intensive effort must still be made to urge mothers to seek prenatal care early in pregnancy, and to learn how to make the necessary arrangements and adjustments which will carry them through confinement safely. That will always prove to be the last and hardest job to do.

I am confident, however, that under the leadership of the medical, nursing, and public health professions, this will be accomplished. The fact is that it must be done. The time has come when, as a people, we must realize the significance of maternity in national terms. Our country has been in the red on the score of true natural increase of population for nearly 10 years. Maternity must be safeguarded. The fears must be lifted from the lives of women that they may accept the obligation of maternity gladly. We have never realized the full significance of the effect of the current dangers on the mental health of our people. We can, therefore, look to those guiding our educational and mental hygiene movements as our natural allies. There is, furthermore, the good will for the asking of every welfare and spiritual agency in the community, including the churches, women's groups, and others, provided we make it possible for them to help us. Therefore, I say the outlook is extremely promising. If the movement has been slow in developing we can now be perfectly sure that the work can be done efficiently and economically. The time has arrived when we can, with pride, look everywhere to developments which will be commensurate with the intelligence and the rich medical facilities of our people and our need for safeguarding every human life.

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Industrial Hygiene—Retrospect and Prospect*

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THIS year marks a quarter century in the history of our Section. Our silver anniversary finds us larger in number, proud of the things accomplished, and enthusiastic about the work yet to be done. We can be gratified by the fact that the accomplishments which have been made in the field of industrial hygiene are the collective contributions of personnel from all professions—physicians, engineers, chemists, statisticians, nurses, and others. We have learned that industrial hygiene is not a monopoly of any one profession, but that all of them working closely together have made progress in the attainment of our common objective.

Of late, we have come to realize that no matter where our work finds us, be it in industrial plant, insurance company, university, or official public health organizaztion, we are primarily interested in promoting health among workers. We have also reached the conclusion that no one agency can ever hope to cope with all the problems in industrial hygiene. Although the responsibility for the health of the industrial worker rests primarily on the shoulders of state and local administrations, it is realized that a plan has to be formulated, which will include all of the agencies interested in industrial hygiene, so that all phases of the subject will receive attention. In other words, all agencies in a locality, official and unofficial, should be marshalled in the campaign to control and prevent disease among workers.

I think we should all ask ourselves the fundamental question, "As industrial hygienists, what is our responsibility in this field of public health?" Years ago we considered our responsibility the control and prevention of accidents in industry. In the last few years our attention has been focussed on the prevention of occupational diseases. Last year,[1] in discussing the development of industrial hygiene in the United States, I called your attention to the important problem of sickness among the gainfully employed. I believe we must consolidate all the gains we have made in the control of accidents and occupational diseases and never relinquish our vigilance concerning these phases of industrial hygiene. However, we should not be satisfied with the achievements of the past, but should continue to expand our activities; the reduction of lost time due to all types of disability among workers is one such worth while activity.

I believe it most fitting at this, our first quarter century of existence, to look back on the things past, to evaluate our accomplishments, to contem-

* Chairman's address presented before the Industrial Hygiene Section of the American Public Health Association at the Sixth-eighth Annual Meeting in Pittsburgh, Pa., October 17, 1939.

plate what still remains to be done, and to see if we cannot chart a future course based on present indications.

RETROSPECT

LEGISLATION

A year ago I pointed out that there were 21 states providing compensation to workers suffering from occupational diseases. During the past year, 2 states, namely, Maryland and Idaho, enacted legislation providing compensation to workers for occupational diseases. Both of these states enacted so-called "schedule" compensation laws. Arkansas, one of the two states which until now has not had any type of compensation, passed legislation this year providing benefits for injuries due to accidents and occupational diseases. Unfortunately, the law was challenged, so that 2 years must elapse before the people of the state will have an opportunity to decide whether the law should go into effect. This year Ohio amended its schedule compensation law into what is practically a "blanket" coverage occupational disease law, by the simple addition to its schedule of one more item called "any other occupational disease."

We have all known from experience that the cost of prevention of injuries caused by accidents, or by occupational diseases, is but a small fraction of the total compensation cost. Today, it is sound economics to prevent rather than to compensate for occupational diseases. Hence, it is gratifying to note that legislatures are recognizing the need for enacting laws concerning prevention. This year the legislatures of Idaho, Maryland, Utah, Montana, and Minnesota enacted laws requiring the reporting of occupational diseases to the state health department and authorizing the state health department to conduct industrial hygiene activities. The preventive features of the new law in Maryland are of particular interest, since there is a provision that the State and Baltimore Health Departments, concurrently, receive reports of occupational diseases, study occupational diseases and ways and means for their control and prevention, and make the necessary rules and regulations for such control and prevention. Such rules and regulations shall have the force and effect of law. These health departments also have the duties to investigate industrial health hazards causing, or suspected of causing occupational diseases, to make recommendations for the control of such conditions, and to enforce regulations regarding occupational diseases. The law also entitles the health department to recommend to the legislature for enactment such measures, including additions to the list of occupational diseases, as their studies and experience may demonstrate to be advisable.

ADMINISTRATION

Unofficial agencies—Not long ago, Dr. McConnell,[2] in a paper discussing the activities of independent agencies in the field of industrial health, classified them into general groups, such as private foundations and national associations, universities, trade associations, insurance carriers, industrial and mercantile establishments, and labor groups. I will not take the time to review the work of all these independent agencies, since Dr. McConnell has done it so excellently in his discussion. However, I should like to list some of these agencies and to note the contributions they have made in the field of industrial health.

The research work carried on by the Air Hygiene Foundation of America, Incorporated, whose headquarters is here in Pittsburgh, has gone a long way toward the advancement of industrial health through the study of occupational diseases. The Foundation has con-

tributed considerable material to the literature of industrial hygiene by publishing reviews and bibliographies of occupational diseases.

Such agencies as the American College of Surgeons, the National Industrial Conference Board, the National Safety Council, the American Standards Association, the American Society of Heating and Ventilating Engineers, the Illuminating Engineering Society, the National Tuberculosis Association, the Saranac Laboratory for the Study of Tuberculosis, and numerous others are taking a deep interest in the subject and have contributed considerable data. The contributions of the American Medical Association have been augmented and coördinated through the formation of the Council on Industrial Health.

Industry has for some time been very active in the field of industrial health, and of late has contributed much to the preventive phases of this problem. The National Association of Manufacturers recently appointed a committee on healthful working conditions. This committee is especially interested in bringing industrial hygiene programs to the small plants, which are in no position to carry on such a program of their own accord. Among the trade associations, the work of the American Foundrymen's Association is noteworthy. This particular agency has been active in the development of good practice codes [3] in the foundry industry, and in the collection of data for the purpose of developing information whereby the objectives of the various codes may be achieved.

Nearly all of the insurance companies, especially those who act as compensation carriers, maintain industrial hygiene laboratories for the study of existing industrial health hazards and the means for controlling these hazards. During the last year or two, many labor organizations have increased their efforts to promote health among their members.

I have only presented a partial list of the various unofficial agencies active in the field of industrial hygiene, but I think the lesson to be gained from all this is that the official agency in any community responsible for the protection of the health of workers cannot overlook the work of these unofficial organizations, and should develop a plan for coördinating all the activities in the community.

Official agencies—A year ago I observed that in the short period elapsing since the passage of the Social Security Act the development of industrial hygiene has been rapid. At that time, a summary of the industrial hygiene units in the various states was presented. along with the number and kind of personnel engaged in this work, and the annual budget for each unit. During the past year, several new states have undertaken industrial hygiene work, among them being Idaho, Colorado, and Utah. In addition, several large cities, such as Los Angeles, are undertaking this type of activity. I have already listed the several states whose legislatures passed laws providing for the establishment of industrial hygiene within the state health department. It is gratifying to note that some of the states actually appropriated funds for the conduct of this work, so that there is less dependence upon federal government subsidy. It should also be noted that many of the industrial hygiene units have strengthened their organizations by acquiring trained personnel and by expanding their activities.

One of the points stressed in my address a year ago was the necessity for a closer coöperation between the industrial hygiene personnel in the central organization and the various local public health units, such as city, county, or district health departments. During the past year we have seen such a

coöperative plan develop and work successfully in several of our states. It has also been possible during the past year to note progress in the plan for integration of industrial hygiene with the other health services in a community, so that public health is brought directly to all the gainfully employed in the state.

In order to illustrate how such an integrated effort can work successfully, I should like to present the activities now going on in Utah. At present, the Division of Industrial Hygiene of the National Institute of Health is conducting a coöperative study with the Utah State Board of Health, concerning the nature and extent of occupational diseases in Utah. The information so obtained will be used as a guide in the enactment of legislation for the compensation of injuries to health resulting from exposure to industrial health hazards and in the support of a permanent program designed to control such hazards. Without going into the details of the study itself, I should like to list the various health services in the State Department of Health coöperating in the investigation. For example, the District Health Officers of the areas in which the studies are being made are taking an active part in assisting the Service physicians in the physical examinations of the various workers. All serological examinations are being made by the State Board of Health laboratories. The Dental Division of the State Board of Health furnishes the services of a dentist for oral hygiene studies. The Division of Epidemiology is collecting information on the prevalence of various diseases in the communities in which the establishments being studied are located. With reference to the environmental investigation, the State Division of Engineering is assisting in the study of the working environment and is also making sanitary surveys in the communities in which the workers live. Thus, we will have information not only on the exposures of the employees while at work, but also the conditions under which they live. It is evident that by such an integrated program public health is being practised more effectively in Utah, and industrial hygiene takes on its real meaning—that is, health promotion among workers. In all of this work in Utah excellent coöperation has been received from organized labor, industry, the medical profession, and, especially, from the Industrial Commission.

The U. S. Public Health Service has always recognized that there are other agencies in federal and state government that are concerned with industrial hygiene problems. For this reason, it has in its own relations with federal agencies striven for a joint approach to the problem and has urged a similar activity on the part of state agencies. That such arrangements in the promotion of industrial hygiene activities are sound and practicable is amply demonstrated in the official relationships which now exist in several states, and notably in such states as California, Wisconsin, North Carolina, Utah, and Rhode Island. For example, in the State of California the Industrial Accident Commission furnishes the Industrial Hygiene Service of the State Health Department with copies of all occupational diseases reportable by law to the former agency. These are investigated by the health department. In addition, the factory inspectors of the Commission call upon the Industrial Hygiene Service to make technical investigations of potential health hazards in industry. Written copies of the results of such investigations are furnished to the Industrial Accident Commission for action, since it is this latter agency which is charged by law to enforce rules and regulations designed for the protection of the health of workers. Practically identical relationships exist in Wisconsin. In this

state a physical examination program was recently organized by the Industrial Commission in collaboration with the Industrial Hygiene Division of the Wisconsin State Board of Health.[4] This plans appears to be an excellent approach to medical control of industrial health hazards which, coupled with engineering control, should go a long way in the prevention of industrial diseases.

Last year, I also emphasized the importance of supplementing our present information on occupational diseases and accidents with a knowledge of absenteeism with respect to frequency, duration, and cause in each numerically important occupational group in a working establishment. At that time it was indicated that such data will serve to reveal to the management and the public health worker the type of action which should be taken to obtain the maximum reduction in the amount of time lost from work on account of disability. Although in the short time which has elapsed it is not possible to present any specific statistics, it is gratifying to state that one large industrial concern, employing several hundred thousand workers, has inaugurated a plan of reporting occupational morbidity. In addition, several states have also undertaken this activity in coöperation with industry. To assist in collecting such data, the Division of Industrial Hygiene of the National Institute of Health has developed a simple report card, which can also be used as a punch card for the analysis of the reports, and has prepared a manual indicating how the data should be collected and recorded.

In inaugurating industrial hygiene programs the various states and cities first undertook to define the problem in each locality. This definition was attempted through the medium of the industrial hygiene survey of potential exposures and by an evaluation of present health services in industry. Today, practically all of the states engaged in industrial hygiene work have completed these surveys and are now actively engaged in controlling the health hazards revealed by these studies. The Division of Industrial Hygiene of the National Institute of Health is at present completing a summary of the various state surveys and will soon publish information on the exposure of approximately 1½ million workers in 17,000 plants to various materials and conditions of public health significance. Preliminary data show that only one-fourth of the workers in these plants had the services of a full-time safety-director, and that only 15 per cent of the workers were provided with a plant physician, and about one-third had the services of a full-time plant nurse. One interesting finding with reference to present health service facilities in these 17,000 plants deals with sickness records. The survey data show that nearly half (45.4 per cent) of the workers were in plants maintaining sickness records, indicating that some information on the extent of so-called "non-occupational" illnesses in industry is at hand.

With reference to the exposure of these workers to various materials and conditions of public health significance, it was possible to estimate the number of workers which could be expected to be exposed in all United States industry. For example, nearly 1½ million people are exposed to the hazards from carbon monoxide gas and ¾ million persons to lead and its compounds. Slightly more than 1 million persons are exposed to the inhalation of silica dust, while the most frequent exposure is to agents capable of causing dermatitis.

Some information was also obtained on the control measures now being employed with reference to some of these exposures. For example, in connection

with silica dust, 93,244 persons were found to be exposed, and of this number 14 per cent of the workers were provided with local exhaust ventilation. Wet methods were frequently employed, and so were respirators. Although the degree of protection afforded by these various measures was not evaluated at the time of the survey, still we have an indication of the extent to which steps have been taken to ameliorate conditions, and from the brief data presented it appears that much needs yet to be done in this field.

Two years ago, the various individuals engaged in industrial hygiene activities in government services banded together to form the National Conference of Governmental Industrial Hygienists.[5] The objects of the Conference are to promote industrial hygiene in all its aspects and phases, and to coordinate such activities in official federal, state, local, and territorial organizations. This organization has been instrumental in encouraging the interchange of experience among industrial hygienists in such official organizations. In April of this year, the second annual Conference was held, of which an entire day was devoted to reports from 11 committees. To give one an idea of the work being undertaken and actively pursued by this Conference, I should like to list the various committees which reported this year and which have been actively continued. One committee is engaged in the study of methods in appraisal of industrial hygiene problems in the localities, while another is concerned with the relationship of industrial hygiene activities to industry, labor, the medical profession, and other agencies. There is a committee on technical standards and this committee has been organized into several sub-committees. A committee on industrial hygiene education also reported, while the committee to study methods of securing effective and uniform reporting of occupational diseases and other illnesses among workers was able to contribute substantially to this subject. Other committees are those dealing with administrative development of industrial hygiene in the state through local departments of health, a committee on industrial health codes, one on the study of industrial hygiene legislation, and a committee on industrial hygiene personnel. And, finally, a committee was organized to develop a standard system of reporting industrial hygiene activities.

In connection with some of the well established public health functions, suitable forms for recording progress have been developed and found practicable. No such established technic has been developed for industrial hygiene, since it is only in the last two or three years that our various state health departments have become active in this field. Without going into a discussion of what constitutes a satisfactory report of accomplishments or progress at this time, suffice it to say that after deliberate study some simple forms were developed to be used as a starting point for the recording of activities and achievements. In developing these forms it was kept in mind that a state industrial hygiene program is essentially concerned with application of research and certain educational functions. In considering the work of an industrial hygiene division, experience has shown that services are rendered because of requests, because of a long range program, and as a result of reports of morbidity which may be made to the health agency. The forms to record such information have recently been given a trial and appear to work satisfactorily. In fact, these forms have the advantage of calling to the attention of the industrial hygiene administrator some of the shortcomings of the program.

At this point mention should be

made of a few of the accomplishments in our newly formed industrial hygiene units. In one state, functioning on a limited budget of $10,000, and with only the services of 1 physician and 1 engineer, it was possible to control silicosis and other dust hazards effectively in the granite, slate, talc, and asbestos industries in that state. All this was made possible by the active participation and coöperation of industry and labor. As a result of these combined efforts more than $100,000 worth of dust control equipment has been installed in various granite cutting sheds in this state, and approximately $25,000 has already been spent for the control of the dust hazard in granite quarries. As a result of the efforts of the work of this small unit it may be truthfully said that the dust hazard has been controlled for nearly 4,000 workers in this state. This is, indeed, a worthy achievement.

In another state, several thousand physical examinations of workers in dusty trades brought out many defects in health among the workers, and steps were taken for the correction of these physical defects. In addition, the control of the working environment contributing to some of these ailments was also effected. In still another state many industries were investigated and as a result of some of these studies, approximately 5,000 persons may now be said to be working under more healthful conditions. In one of our New England states routine investigations were made in plants housing several thousand individuals and improvement made in the working environment, so that health hazards were eliminated. Furthermore, studies as a result of a planned program were also undertaken and remedial measures instituted. In the foundry industry in this state approximately $300,000 were expended for control measures as a result of recommendations made by the industrial hygiene unit. All told, some 14,000 persons were in these industries, so that working conditions for these people are now greatly improved. This particular industrial hygiene unit also carried on an extensive consultation service on numerous industrial hygiene topics.

So far I have sketched for you two of the features of an industrial hygiene program, namely, that of application of research and educational activities. I have said nothing about the first part of such a program, that is, fundamental research. Those of you who have been following the literature on the subject of industrial hygiene, have probably noticed the tremendous amount of information now being published in the field of industrial hygiene. These contributions come to us from industry, insurance companies, universities and governmental agencies. The industrial hygiene building of the National Institute of Health was recently completed. so that all of the activities in industrial hygiene of the U. S. Public Health Service are now together. It is hoped that with the states carrying more of the burden of the preventive phases of industrial health, the Service will have more time to devote to research.

In closing this brief and incomplete summary of some of our accomplishments, I should like to state that we have gone far in the field of medical control, in toxicology, and in engineering control of health hazards in industry. There was a time when all discussions of engineering control of occupational diseases were always prefaced by the remarks that there is a paucity of data on the subject. Today, we can proudly say that we have accumulated a considerable amount of information in the last four or five years. This body of information is being applied successfully in many of our states, and today we feel confident that there are really very few exposures which are impossible of control.

PROSPECT

Although it has been very gratifying to discuss the various achievements in industrial hygiene in the last year or two, we must not think that we can rest upon our laurels. Industrial hygiene, as a special field in public health, is relatively in its infancy. Although we can truthfully say that the lag between the knowledge of how to control industrial health hazards and the degree of success in applying this knowledge is rapidly diminishing, much still remains to be accomplished.

In discussing prospects in industrial hygiene, no attempt will be made to paint a glowing picture of the future in this field, but to indicate briefly some of the problems confronting us and what may be done to solve them.

One of the primary needs today is a sufficient number of trained personnel. It is important, therefore, that institutions for teaching of industrial medicine and the methods employed in the engineering control of health hazards in industry be organized as quickly as possible. The Division of Industrial Hygiene of the National Institute of Health has attempted to overcome the lack of trained personnel by presenting brief courses in industrial hygiene and by arranging for in-service training in the various state units for the personnel now entering the field. These measures are merely stop-gaps and not very satisfactory, so that serious consideration should be given by some of our schools of public health and medical schools to developing a course in industrial hygiene.

All of the states now engaged in industrial hygiene activities spend approximately ¾ million dollars. It is evident that with the numerous problems confronting these various units, this is far too small a sum and that more money will have to be appropriated for this work. In addition, our observations and reports which we receive from the various states indicate that there is a lack of trained personnel to carry on the various activities. For example, one of the problems which confront most of the states is the reporting of occupational diseases and other illnesses. In some of the states the reporting is now much better than it was. In one state, for example, some 5,000 reports of occupational diseases were sent in to the state health department last year. However, but a small number of these reports were investigated, since no personnel was available for the all-important follow-up work. I believe we should all strive to increase our budgets and our personnel and that the various legislatures in the states be urged to appropriate sufficient funds to carry on this important activity in a manner commensurate with its importance.

Mention has already been made of the active interest on the part of industry in the field of industrial hygiene. After all, corrective measures in industry are accomplished by private effort and private funds. The important task for any industrial hygiene administration is to persuade industry to solve its own health problems. The official agency mainly serves in aiding industry to evaluate its problems, suggests ways and means for their control, develops standards of good practice, furnishes technical guidance, and conducts educational programs. Industry has not been slow in accepting its share of the responsibility and is coöperating with official agencies. Recently, through the American Association of Industrial Physicians and Surgeons, a committee was organized to study present industrial hygiene facilities in representative industrial establishments for the purpose of evaluating these facilities and developing standards which would serve to expand and improve present programs.

The question of good practice codes

has received attention of late among our trade associations and state industrial hygiene units. A good practice code for the elimination of a hazardous condition in an industry should do more than set forth the desirable conditions under which work may be carried on, but should also instruct the management as to how these desirable conditions may be achieved. An example of the latter type of code is the U. S. Public Health Service milk ordinance and code. This particular publication contains a 13 page ordinance while the code itself, which gives the information as to how the desirable items of the ordinance may be complied with, consists of nearly 100 printed pages. The codes of the American Foundrymen's Association are excellent examples of what may be done to aid management to clean house and provide a safe and healthful working environment. More such codes are greatly needed.

I have already mentioned the trend today in industrial hygiene. showing that more and more local health organizations are beginning to participate in this important field of public health and I have also indicated how the industrial hygiene program in a state can be integrated with other health services in a health department, with other governmental agencies, medical organizations, labor, industry, and nonofficial agencies. I would urge all public health administrators to consider seriously this important phase of the program and to do all that is possible to devise a plan which will coördinate the activities of all the agencies interested in, and responsible for, industrial hygiene in their communities.

Our problems in industrial hygiene will be constantly increasing rather than diminishing, in spite of all our efforts in the field. This is largely due to the fact that added responsibilities are given to administrators due to a variety of causes. With increased mechanization in industries, with the use of old and new chemical compounds in many of our processes, the responsibilities given us by legislation, and those which might be added in case of war, all of these factors, and many more too numerous to mention, will add greatly to the burden of industrial hygienists in the future. I believe that all of us should have our programs so planned as to be able to meet these exigencies as they arise.

So far I have been discussing the prospect of industrial hygiene from the administrative point of view. There are, of course, many technical problems which are also in need of solution. In the field of personal hygiene we are greatly in need of more sensitive methods of diagnosis and we are especially in need of tools which will enable us to detect incipient cases of disease before real damage occurs. In the environmental field we have made great strides in developing more precise sampling instruments and more precise methods of analysis, as evidenced by the papers to be presented here this week. However, as our increased engineering knowledge enables us to control environmental conditions to a point where only small amounts of toxic materials remain in the air, it will be necessary to develop more precise sampling and analytical methods so that we can detect these minute amounts. One could, of course, argue that our present methods enable us to detect the so-called threshold limits, so that we need not worry about finding materials below this toxic limit. However, most of these limits are merely tentative, and increased medical knowledge may show that our standards today may be far too dangerous tomorrow. For that reason we should continually strive to improve our sampling and analytical technics in engineering control of industrial health hazards. This Section has a committee on Chemical

Procedures in Air Analysis and yesterday we heard an excellent report on the work in progress. It is hoped that research can be developed on the subject of chemical procedures in the determination of toxic materials in industry, and that as a result of such research and the work of this committee and others, a handbook on standard methods may be developed.

I have attempted to sketch briefly some of our accomplishments and a few of the problems and needs in industrial hygiene. I think we can be heartened by the actual progress made and the prospects before us. The members of this Section have made important contributions for the past 25 years to the administrative and technical phases of industrial health and I am convinced that we must continue to meet the challenge of new responsibilities, and I am sure that we will do so. Industry is cognizant of the fact that it pays to control and prevent industrial health hazards. Labor is now sufficiently well informed, organized, and articulate to demand safer and more healthful working conditions. We have at hand the tools and the information necessary for creating healthful working conditions and for improving the health of workers. It seems to me that under such favorable conditions we should all strive for the goal before us so that we can bring positive health to the industrial worker.

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Professional Training Courses

DR. C. C. P. ANNING, Medical Officer of Health for Benoni, South Africa, referring to the content of university courses for professional training in public health says, "The public health courses . . . include much study in sanitary details about air pollution and plumbism, leprosy and tapeworm infection, yet no time at all is given to sociology, to economics, to social psychology or social anthropology, subjects which form an essential background to the work of the health officer today. There is no training given even in the art of health education, though perhaps it is felt that anyone with an ounce of bounce can put health education across.

As Sir Stephen Tallents said the other day, 'There is an idea that publicity is a sloppy kind of business that requires little forethought, little planning, little pains and little organization.'"

Sylvatic Plague*

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THE Executive Committee has held no meetings. No problems were submitted for consideration. In fact, it is apparent that without further more accurate knowledge relative to the epidemiology of plague infections in rodents, no more significant and effective suppressive measures than those in use can be devised. An informative statement relative to diseases of rodents has been mimeographed, and at least 500 copies distributed throughout the state of California as well as a limited number in other states. As a whole, the pamphlet has been well received and has not aroused the reaction among chambers of commerce which had been predicted. Vacationists and hunters are quite familiar with the inherent dangers of exposure to rodents. Judicious publicity in the form of talks and in the daily press keeps the layman well informed and continuously in touch with the progress of the various findings.

EPIDEMIOLOGICAL OBSERVATIONS DURING 1938 AND THE FIRST HALF OF 1939

Again the Committee on Sylvatic Plague has collected, in coöperation with the State Health Officers and Dr. C. R. Eskey of the U. S. Public Health Service, statistical data concerning the extent of human and rodent plague. The pertinent data may be summarized as follows:

I. HUMAN PLAGUE

No human cases of plague have been recognized or reported. In this connection it is worth noting that several reports and laboratory observations attest to the beneficial effect of prontosil or sulfapyridine in the treatment of human plague infections. Carman (1938) reported from East Africa the administration of prontosil in 6 cases, 3 of which recovered. Vine (1938) in a small epidemic in the Nilgiris treated 3 cases and all recovered. In the experiments of Schütze (*Lancet*, Feb. 4, 1939, p. 266) sulfapyridine proved to be the most efficacious of the newer preparations in chemotherapy of *Pasteurella pestis* infection of rats and mice.

II. RODENT PLAGUE (ANATOMICAL AND CLINICAL) AND INFECTED FLEAS COLLECTED FROM WILD RODENTS

The data pertinent to the survey activities are summarized in Tables I and II. The committee is indebted to E. T. Ross, California State Department of Public Health, for the summary in Table I and to Dr. C. R. Eskey for the report which is reviewed and condensed in Table II.

* Fourth Report of the Chairman of the Sylvatic Plague Committee of the Western Branch American Public Health Association. Read before the Tenth Annual Meeting in Oakland, Calif., July 23–28, 1939.

In California the collection and autopsy of 10,863 rodents in 301 different areas yielded 6 *C. beecheyi* squirrels with anatomical markings indicative of plague. It is of interest to note that for the first time since the existence of plague has been recognized through the appearance of human cases or the demonstration of fleas infected with *P. pestis*, grossly diseased squirrels were found in two counties. El Dorado County on the shores of Tahoe region, proved to harbor plague through one human infection in 1936 and another in 1937, produced 2 such squirrels.

In 1933 San Bernardino County was suspected of being a sylvatic plague area, but annual surveys yielded only infected fleas until in 1938 when 4 Fisher squirrels with definite plague lesions were found. Again the injection of squirrel organs into guinea pigs in the form of pools was proved valuable. The number of rodents included in a pool varied from 5 to 12 in the 6 collections which proved to be infected with *P. pestis*. The advantages of examining fleas collected from apparently healthy squirrels is equally attested by the demonstration of infected vectors in 17 collections. Thus the surveys disclosed 16 new areas as sylvatic plague foci. The existence of latent plague in golden mantled squirrels in Plumas County has been established.

In 1939 an old focus in Ventura County showed renewed activity. Three young Beecheyi squirrels with enormous splenic tumors, and no buboes or other markings were proved to be the victims of an acute plague septicemia. Infected fleas have recently been found in Contra Costa County.

If one surveys with an open mind the enormous amount of work so faithfully carried out by the survey crews, and evaluates the benefit derived from these efforts, one wonders if the time has not arrived to review and re-orient the procedures. That sylvatic plague exists in California and is widely distributed, is now an established fact.

TABLE I

California Counties in Which Plague Was Demonstrated During 1938

Plague Demonstrated in 30 Specimens as Follows:

County	*Individual Rodents*	*Pools of Rodents*	*Rodents in Pool*	*Pools of Fleas*	*Fleas in Pools*	*Number of Foci*	*Totals Collected*	
							Rodents	*Fleas*
El Dorado	2	..	..	2	26	3 (new)	937	1,053
Fresno	..	2	12	2	91	3 (new)	5,004	12,730
Plumas	..	1	10	..	..	1 (new)	237	163
San Benito	..	1	10	2	394	2 (new)	965	8,429
San Bernardino	4	1	5	6	361	7 (new)	2,301	4,378
Santa Clara	..	..	..	1	75	1 (old)	726	4,758
Santa Cruz	1	1	5	4	136	3 (old)	693	4,226
	7+	6+	42	17+	1,083	20	10,863	35,737

Other Counties Surveyed

Alameda, Contra Costa, Kern, Lassen, Los Angeles, Madera, Mariposa, Monterey, Marin, Merced, Placer, San Mateo, San Luis Obispo, San Joaquin, Stanislaus, San Francisco, Sonoma and Tulare

Rodents collected	16,172
Fleas collected	69,114

TABLE II

Plague Infection of Wild Rodents Demonstrated at the U. S. Public Health Service Laboratory, San Francisco, January, 1938 to June 30, 1939

State	County	Date	Species of Rodent	Positive Inoculations for Plague: Fleas	Lice	Ticks	Tissue	Total Positive Inoculations for Plague
Arizona	Apache	9/38	*Cynomys gunnisoni zuniensis*	1	..	..	..	1
Idaho	Bannock	5/38	*Citellus armatus*	2	..	..	2	10
	Bannock	6/38	*Marmota flaviventris*	1	..	..	..	
	Bear Lake	5/38	*Citellus armatus*	3	..	..	1	
	Fremont	6/39	*Citellus armatus*	1	..	..	..	
Montana	Beaverhead	6/38	*Citellus richardsonii*	1	..	..	1	4
	Gallatin	5/38	*Citellus elegans*	2	..	..	..	
Nevada	Clark	4/38	*Neotoma fuscipes mohavensis*	10	..	..	..	13
	Clark	4/39	*Neotoma desertorum*	3	..	..	..	
New Mexico *	Catron	8/38	*Cynomys gunnisoni zuniensis*	13	..	..	9	25
	Catron	8/38	*Peromyscus truei*	1	..	..	..	
	Catron	8/38	*Citellus grammurus*	1	..	..	..	
	Dona Ana *	4/38	*Dipodomys ordii* (kangaroo rat)	..	..	..	1	
Oregon	Baker	4/38	*Citellus oregonus*	2	..	..	2	14
	Grant	5/38	*Citellus oregonus*	4	..	..	1	
	Grant	5/39	*Citellus oregonus*	..	..	..	..	
	Union *	4/38	*Citellus oregonus*	..	..	..	2	
	Wallowa	6/39	*Citellus columbianus*	1	..	..	2	
Utah	Kane	5/38	*Neotoma desertorum*	1	..	..	..	4
	Rich	1938	*Citellus armatus*	2	..	..	..	
	Wasatch	6/38	*Citellus armatus*	..	..	..	1	
Washington	Adams	3/38	*Citellus washingtonii*	10	1	..	1	23
	Adams	4/39	*Citellus washingtonii*	..	..	..	..	
	Lincoln	4/38	*Citellus washingtonii*	7	..	..	2	
	Lincoln	4/39	*Citellus washingtonii*	..	..	..	..	
	Lincoln	5/39	*Sylvilagus N. nuttallii*	..	..	..	1	
	Spokane *	6/39	*Citellus columbianus*	..	..	..	1	
Wyoming *	Lincoln	1938	*Citellus armatus*	20	2	2	15	53
	Lincoln	1938	*Citellus elegans*	4	1	..	..	
	Lincoln	1938	*Marmota flaviventris*	1	..	..	..	
	Sublette	1938	*Citellus elegans*	2	..	..	..	
	Uinta	6/38	*Citellus elegans*	1	..	..	..	
	Uinta	6/39	*Citellus armatus*	1	..	..	1	
	Uinta	7/38	*Cynomys leucurus*	3	..	..	..	
Total positive animal inoculations				98	4	2	43	147

* New infections

Furthermore it is equally recognized that it may appear in epidemic proportions any time and anywhere in the state provided certain conditions, as yet inadequately understood, are conducive to an increased distribution of the infective agent. How to prognosticate the occurrence of these epizoötics with their inherent dangers to man is a complex problem which requires field investigations and analysis by diverse groups of mammalogists and entomologists.

It has been repeatedly emphasized that sylvatic plague is everlasting and that the available knowledge suggests continuous vigilance in preventing contact of the rat population with the diseased wild rodents. In California this type of suppressive work has been effectively carried out by the State Department of Agriculture. At least 3,700,000 acres in which sylvatic plague has been demonstrated have been treated with poison grains, carbon bisulphide and miscellaneous materials. The estimated cost of ground squirrel suppression during a year, for all purposes and agencies, is $614,000. The outlay of WPA funds approximates $58,500. It is to be hoped that the advantages gained may be maintained by slightly

lessened activities. However, experience has taught that with the present-day knowledge, little permanent effect may be anticipated. Here again, more research is doubtless needed in order to accomplish the desired protection without the expenditure of large sums of money.

The survey activities by the U. S. Public Health Service as shown in Table II have disclosed a number of significant facts:

1. Sylvatic plague exists now in 10 of the 11 states. In 1938 it has conclusively been demonstrated in various epizoötics of prairie dogs and squirrels (fleas) in Arizona, New Mexico, and Wyoming. Thus sylvatic plague has crossed the Continental Divide and the possibility of extension in the Rio Grande deserves continuous observation.

2. Extension into new counties has been observed in Idaho, Montana, Oregon, Utah, and Washington. It is significant that in a few instances the presence of sylvatic plague announced itself in the form of epidemics of the rodents with a notable mortality, and thus attracted the attention of the representatives of the Biological Survey. The splendid coöperation offered by this service to the sylvatic plague studies deserves special comment.

3. New species of rodents such as kangaroo rats (Mexico), cottontail rabbits (Washington), and the pack rats of the desert area of Nevada have been found as hosts of *P. pestis*.

4. The collection and inoculation of guinea pigs with pools of fleas, lice, and ticks has again yielded more information than the examination of the carcasses of rodents shot or trapped. If one excludes from consideration the tissue examinations made on dead or sick rodents collected in actively epidemic areas (New Mexico, Washington, and Wyoming), the benefit derived from these tests appears definitely limited. Without mass inoculation of fleas sylvatic plague surveys cannot be considered modern. Although the majority of health officers accept the demonstration of infected fleas removed from healthy rodents as *de facie* evi-

TABLE III

Rodents Known to Suffer from Spontaneous Plague

Sciuridae	Washington ground squirrel	*Citellus Washingtonii* (Washington)
	Richardson's ground squirrel	*Citellus Richardsonii* (Montana)
	Wyoming ground squirrel	*Citellus Richardsonii elegans* (Wyoming, Montana)
	Uinta ground squirrel	*Citellus armatus* (Idaho, Utah, Washington, Wyoming)
	Oregon ground squirrel	*Citellus beldingi oregonus* (California, Oregon)
	Columbia ground squirrel	*Citellus columbianus* (Oregon, Washington)
	Say's rock squirrel	*Citellus variegatus grammurus* (Utah)
	Beecheyi ground squirrel	*Citellus beecheyi* (California)
	Fisher's ground squirrel	*Citellus beecheyi fisheri* (California)
	Yellow bellied marmot	*Marmota flaviventris englehardii* (Utah, Montana, Wyoming)
		Marmota flaviventris nosophora
	Utah prairie dog	*Cynomys parvidus* (Utah)
	Prairie dog	*Cynomys leucurus* (Wyoming)
	Prairie dog	*Cynomys gunnisoni zuniensis* (Arizona, New Mexico)
	Tahoe chipmunk	*Eutamia quadrivittatus frater* (Aller) (California, Nevada)
	Golden mantled squirrel	*Callospermophilus chrysodeirus chrysodeirus* (California)
	Sierra Nevada chickaree	*Sciurus douglasii albolimatus* (California)
	Sierra Nevada flying squirrel	*Glaucomys sabrinus lascivus* (Bangs) (California)
Muricidae	Gilbert white footed mouse	*Peromyscus truei Gilberti* (California, New Mexico)
	Western Bushy-tailed woodrat	*Neotoma cinerea occidentalis* (California)
	Intermediate woodrat	*Neotoma lepida intermedia* (California)
	Mohave woodrat	*Neotoma fuscipes mahavensis* (Nevada)
	Desert woodrat	*Neotoma desertorum* (Nevada, Utah)
Heteromyidae	Kangaroo rat	*Dipodomys ordii*
Leporidae	Cottontail rabbit	*Sylvilagus nuttallii*

dence of the existence of sylvatic plague in the area, there is still some hesitancy on the part of others to accept this interpretation. The committee has already expressed its opinion in 1937 and again in 1938 in the sense that the recognition of either infected rodents or fleas constitutes conclusive proof of the presence of sylvatic plague in the respective area and that control measures must be applied to this particular region.

A survey concerning sylvatic plague was undertaken in 1938 in the Province of British Columbia in coöperation with the Provincial Department of Health and the Dominion Department of Pensions and National Health. The survey activities covered examination of *Citellus columbianus* and *Marmota flaviventris avara*. The inoculation of tissues and pools of fleas yielded negative findings for *P. pestis* on guinea pigs. Thus *no* sylvatic was discovered. Similarly rat collections in Vancouver and New Westminster were made. The total flea index was 0.91. A high percentage, 98 per cent, of *Rattus norvegieus*, was observed. *P. pestis* was not discovered in any of the tissues or flea specimens submitted for examination.

In view of the survey studies made throughout the Western States since 1908 and particularly since 1934, the rodents listed in Table III are known to suffer from spontaneous plague.

III. SCIENTIFIC INVESTIGATIONS

1. *Vector efficiency and plague transmissions*—Dr. C. R. Eskey has continued his studies on the transmission of plague by fleas from wild rodents. He has been able to infect 26 species of wild rodent fleas with plague transmitted by bites of 13 species found on wild rodents. These fleas included nearly all of the common species encountered in the West.

2. The fleas on prairie dogs in Arizona and New Mexico have been studied by William L. Jellison. Three closely related species—one new one, *Opisocrostis tuberculatus cynomurus*—have been identified. In several localities the prairie dogs were heavily infected with human fleas.

3. William L. Jellison of the Rocky Mountain Laboratory, U. S. Public Health Service, has studied the possible relationship of flesh-eating birds to the epidemiology of sylvatic plague in Montana. He found that predatory species may serve as accidental hosts of rodent fleas. In particular the burrowing owl (*Speotyto cannicularia*) deserves consideration. Certain forms of predatory birds fed plague-infected guinea pig tissues were consistently infectious, while a few species fed plague tissues were non-infective.

4. Under the guidance of Drs. T. I. Storer, M. A. Stewart, and C. M. Wheeler, a field crew of 2 to 3 men appointed by the State Department of Public Health has collected data concerning the activities of rodent species (particularly *Citellus beecheyi*) and the distribution of flea species. Trapping operations were initiated at Bass Lake, Madera County, in order to obtain information which may be of value in the planning of suppressive measures relative to recreational areas. The observations covering one year are being analyzed.

5. Studies on the host-parasite relationship to *P. pestis*, the susceptibility and immunity of Beecheyi and Richardson squirrels, and investigations on the vector-parasite cycle are in progress at the new sylvatic plague laboratory of the George Williams Hooper Foundation, University of California, endowed by the Rosenberg Foundation. Although the investigations are in active progress it is worth noting that in some series only 50 per cent of the squirrels trapped in regions not proved to be plague infected succumbed to intra-

cutaneous injections of from 9–23,000 *P. pestis*.

Attention is called to the following literature:

1. Howell, Arthur H. Revision of the North American Ground Squirrel. *North American Fauna, No. 56*, U. S. Dept. of Agri., Apr., 1938.

2. Barona, Jose Maria de la, and Corica, Pablo. Rural Plague in Argentine. *Folia biologica*, 83–84: 355 (Feb.-Mar.), 1938.

3. Kalabukhov, N. I., and Reevskii, V. V. Ecological Peculiarities of the Ground Squirrel at Different Periods of Its Annual Life Cycle. *Revue de Microbiologie d'Epidemiologie et de Parasitologie Saratov*, 15, 1:109–130, 1936.

4. Rosier, A. J. Plague Campaign in Java for 1935. *Mededeel. v. d. dienst. d. volksgezondh. in Nederl.-Indië*. No. 26, 1937.

5. Stewart, M. A., and Mackie, D. B. The Control of Sylvatic Plague Vectors. *Am. J. Hyg.*, 28:469–480, 1938.

CHRISTMAS SEALS

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Types of Tubercle Bacilli in Lesions of Garbage-Fed Swine

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THE feeding of garbage to swine is a fairly common practice that is justified in most instances by: (1) being a practical and expedient manner for the disposal of unused food or food that is unsuited for human consumption, and (2) by being an economical source of food for the feeding of swine. It is obvious, of course, that the indiscriminate collection of garbage and feeding it to swine in an uncooked state provides opportunity for the transmission of certain bacterial and parasitic diseases.*

There are available several reports in which human tubercle bacilli have been recovered from the tuberculous lesions of swine that had been fed uncooked garbage. There are, however, comparatively few reports as to the frequency of the different types of tubercle bacilli responsible for lesions of tuberculosis in garbage-fed swine. That data might be secured concerning this problem as it exists in a large metropolitan area, a study was made of material obtained from one of the abattoirs in South St. Paul.

MATERIAL AND METHODS

Only swine that were definitely known to have been fed garbage were included in the study. The identity of such animals was ascertained at the time of purchase by the management of the abattoir and consequently it was possible to slaughter the animals separately from the "regular kill." This procedure facilitated the post-mortem examinations by the federal meat inspectors who collected the specimens subsequently utilized for laboratory examination. Attempts to secure information as to the origin of the garbage fed to the swine were unsuccessful.

The 11 lots of swine were slaughtered over a period of approximately 4 months. No selection of the lots of swine included in the study was exercised. All garbage-fed swine presented for slaughter during the period of the investigation were included in the study.

The 11 lots of swine comprised a total of 264 animals. By the usual careful post-mortem examination 75, or 28.4 per cent, of the carcasses were considered by the meat inspectors to contain gross lesions of tuberculosis. The lesions in practically all instances were classified as "slight" with the disease limited to the lymph nodes of the head and neck or the mesentery. The tissues obtained from the 75 swine

* Many of the problems associated with the feeding of garbage to swine have recently been presented by Germanio. In Canada the feeding of swine with garbage, swill, meat scraps, offal, or vegetable refuse, either raw or cooked, obtained elsewhere than on the premises where fed, is prohibited unless a license has first been obtained from the Veterinary Director General.[14]

that were considered at necropsy to be tuberculous may be briefly summarized as follows: mesenteric lymph nodes from 27 swine, submaxillary lymph nodes from 19, cervical lymph nodes from 14, portal lymph nodes from 1 hog. In 14 specimens from 14 swine the anatomic situations from which the lymph nodes were obtained were not designated. In all cases except 2 only one specimen was received from each carcass. In 2 cases both a submaxillary and a mesenteric lymph node were received, but only the mesenteric nodes were utilized.

The character of the lesions presented by the respective lymph nodes was as follows: multiple caseous abscesses 48: caseocalcareus 16; single caseous 6; hyperplasia with minimal necrosis 1. Lymph nodes from 4 cases failed to show definite gross evidence of disease. Most of the lesions were small and many appeared to have been of recent origin. All of the caseocalcareous lesions showed variable degrees of encapsulation and some peripheral fibrosis was noted in many of the lesions that were caseous.

The respective specimens were forwarded to the laboratory in dry borax, each specimen in a separate container. When received, the tissues were immersed in boiling water for 5 to 10 seconds to remove the borax and to reduce the possibility of extraneous contamination. A portion was removed for subsequent histologic study and the most likely portions of the rest of the material were emulsified in sterile sodium chloride solution.

The respective emulsions were used to prepare cultures; both glycerinated and nonglycerinated egg-yolk agar mediums being used.* For the elimination of other than mycobacteria that might be present, those portions of the respective emulsions that were cultured were treated with 5 per cent oxalic acid as suggested by Corper and Uyei. The amount of emulsion used for culture was 2 cc. After preparing the emulsions as described in detail elsewhere 8 slants of medium—4 glycerinated and 4 nonglycerinated—were inoculated and incubated at 37.5° C. for a period of 10 weeks unless positive results occurred sooner.

Each emulsion prepared from the respective lymph nodes was used also to inoculate two guinea pigs subcutaneously, each animal receiving 1 cc. Unless dying before, the guinea pigs were maintained for 8 weeks, when they were killed for necropsy.

In these instances in which acid-fast bacteria were not obtained in culture before the guinea pigs injected with portions of the same emulsion died or were killed, the spleen of one or of both guinea pigs was cultured for tubercle bacilli, whether or not lesions of tuberculosis were discernible.

After cultures had been obtained either direct from the original material or from the spleens of the guinea pigs, the physical character of the different bacterial strains was noted and the bacillary type of each culture determined by the injection of two additional guinea pigs and two rabbits. The dose used in most instances was 0.01 mg. The guinea pigs were injected subcutaneously and the rabbits intravenously. The period of observation for the guinea pigs was 8 weeks; for the rabbits 90 days.

RESULTS

The results of the investigation are summarized in Table I. As may be noted, tubercle bacilli were demonstrated and cultures eventually secured in 47 of the 75 lesions obtained for study. When the 47 strains were typed to distinguish the bacillary type of the respective cultures, 12, or 25.5 per cent, proved to be of the human type while

* The medium was originally described by Capaldi and more recently by Herrold.

TABLE I

Summary of Results of Study to Determine Types of Tubercle Bacilli in Lesions of Tuberculous Garbage-fed Swine

Lot	Number of Swine	Retained for Tuberculosis	Tubercle Bacilli Demonstrated	Type of Tubercle Bacilli *	
				Human	Avian
1	32	12	8	6	2
2	24	7	5	3	2
3	27	4	3	0	3
4	23	4	4	0	4
5	26	5	1	0	1
6	16	9	5	0	5
7	21	5	1	0	1
8	30	8	7	0	7
9	13	5	5	3	2
10	21	4	2	0	2
11	31	12	6	0	6
Totals	264	75	47	12	35

* Type determined by tests of pathogenicity.

35, or 74.5 per cent, were of the avian type. It seems significant that in no instance were bovine tubercle bacilli demonstrated.

Human tubercle bacilli were isolated from the lesions of only 3 of the 11 lots of swine. The total number of animals in the 3 lots was 69. Twenty-four of the 69 carcasses had been "retained" on account of tuberculosis at the post-mortem examination and tubercle bacilli were subsequently demonstrated in 18. Twelve of the cultures were identified as human tubercle bacilli and 6 as being of avian type.

It is of interest that tubercle bacilli were demonstrated as present in only 47, or 62.7 per cent, of the 75 lesions that were considered as tuberculous by the meat inspectors. The difference in the laboratory findings compared to those of the gross examination may be due to several factors such as: (1) inadequacy of the methods used to demonstrate tubercle bacilli; (2) the bacteria may have been dead or avirulent or too few in number to initiate growth on culture medium or produce lesions of tuberculosis in guinea pigs; and (3) some of the lesions in which tubercle bacilli were not established may have been due to causes other than tubercle bacilli. Many of the lesions were minimal in extent and some at least were grossly without convincing characteristics of the lesions of typical tuberculosis.

COMMENT

The susceptibility of the hog to each of the three types of the tubercle bacillus makes the incidence of tuberculosis in swine a fairly satisfactory index as to the amount of bovine, human, and avian tuberculosis in a given community. It is recognized, of course, that the possibility for exposure constitutes an important factor. It is conceivably possible by strict hygienic measures to rear swine free of infection with tubercle bacilli, even though the incidence of tuberculosis in human beings, fowl, and cattle may be high. However, the unsanitary practices frequently followed in rearing and feeding swine for the market usually provide opportunities for contact with one or each of the three types of tubercle bacilli, providing tuberculous fowl, cattle, or human beings exist on the

same premises with the swine, or the animals are supplied foodstuffs containing tubercle bacilli.

Although the susceptibility of swine for avian and bovine tubercle bacilli has been adequately established by many competent investigators, the infectiveness of human tubercle bacilli for swine is not as well understood.* A brief review of the available reports on this question would therefore seem appropriate.

Dinwiddie [6, 7] of the Agricultural Experimental Station of Arkansas in 1899 and 1900 contributed two noteworthy reports on the question of the relative virulence for domestic animals of human and bovine type of bacilli and included a comprehensive review of the literature. He mentioned the experiments of Blumberg who succeeded in infecting swine with sputum from tuberculous human beings. Dinwiddie also made reference to Wesener's review made in 1885 in which it was concluded that of the 71 animals used in feeding experiments, guinea pigs and swine were the species most easily infected with infectious material from tuberculous human beings.

Dinwiddie also reported the results of his own studies in which swine were exposed to experimental infection with human and bovine tubercle bacilli. Tuberculosis of the submaxillary and mesenteric lymph nodes followed the ingestion of tuberculous sputum in 2 of 6 animals tested. A more severe tuberculosis followed the intraperitoneal injection of swine with infective sputum or cultures, and Dinwiddie concluded that a progressive and even fatal tuberculosis may develop in swine following the ingestion of sputum containing tubercle bacilli. Although Dinwiddie expressed the opinion that infection of swine with human tubercle bacilli is insignificant compared to the greater possibility for infection with bovine tubercle bacilli, he mentioned that the experimental evidence did not preclude the possibility of the occasional occurrence in swine of tuberculosis from human sources.

Orth in 1902 was quoted by Salmon as having tested the virulence of human tubercle bacilli for swine. The strain which was used to inoculate 2 swine intraperitoneally and intratracheally was obtained from a case of "phthisis cavernosus" in a human being. The intraperitoneal inoculation failed to induce demonstrable signs of tuberculosis while the animal that had received the infective material intratracheally showed extensive disease in the right lung and in the thymus gland when examined at necropsy 5½ months after inoculation.

Dean and Todd (1902) conducted a series of experiments designed to ascertain whether the virulence of human tubercle bacilli for calves might be increased by passage through other animals including swine. The infectious material used was tuberculous sputum. This was used to inoculate 5 pigs subcutaneously, and in addition 3 pigs received tuberculous sputum by ingestion. Four of the animals inoculated subcutaneously died in 31 to 137 days, while the 5th was killed after 227 days. Severe and widely distributed lesions of tuberculosis were noted in each of the 5 animals. Those receiving the infective material by the mouth developed tuberculous lesions of the head and neck. The authors concluded that in contradiction to Koch's results, human tubercle bacilli are capable of producing in swine a rapidly fatal generalized tuberculosis.*

* The pathogenicity of avian tubercle bacilli for swine is considered in detail in the monograph by Feldman, W. H. *Avian Tuberculosis.* Williams & Wilkins, 1938, 483 pp.

* Dean and Todd gave a brief résumé of Koch's experiments in which 6 pigs were each fed daily for a period of 104 days, 15 cc. of sputum containing tubercle bacilli. In 5 of the animals the results were listed as negative and in 1 animal the

De Schweinitz, Dorset, and Schroeder [9, 16] studied the comparative virulence for swine of tubercle bacilli obtained from both human and bovine sources. The test animals were injected subcutaneously, 4 strains of tubercle bacilli of human origin and one of bovine origin being used. Of the 8 animals injected, all but one showed generalized tuberculosis when examined at necropsy a few weeks to a few months later. The one exception was without evidence of disease when examined at necropsy approximately 5 months after being inoculated. The authors concluded in part that "certain tubercle bacilli of human origin possess quite as great pathogenic power for hogs as tubercle bacilli of bovine origin." Whether or not the tubercle bacilli of human origin used in the experiments of de Schweinitz, Dorset, and Schroeder were in reality tubercle bacilli of the human type might well be questioned. Three of the cultures used were obtained from the spleens of guinea pigs inoculated, in 2 instances, with tuberculous mesenteric nodes of children, and in the 3rd instance with a tuberculous nodule of the peritoneum of a child. The infective material used to inject 2 of the swine was listed as "human intestine (tuberculous)." In view of the prevalence of the bovine type of extrapulmonary tuberculous infection in children in the era (1904) when the report of de Schweinitz, Dorset, and Schroeder appeared, the bovine character of at least some of the tubercle bacilli that these authors used is not improbable even though the infective material was considered of human origin.

In a report published in 1909, Mohler and Washburn mentioned Bang's account of the appearance of tuberculosis among hogs on a farm where the disease was not thought to exist previously. The infection was said to have resulted from the practice of tuberculous attendants spitting on the hogs' feed and about the premises. Mohler and Washburn also quoted a report of Kuese concerning the loss from tuberculosis of 11 3 months old pigs in a single litter that had presumably become infected from tuberculous sputum. The sputum accumulated during the night from a young woman fatally ill with tuberculosis and was thrown into the yard each morning. The young pigs had the liberty of the yard and it is presumed they came in contact with the infective material as a consequence.

Eastwood and Griffith (1914) mentioned that 2 pigs were fed tubercle bacilli of the human type that had been obtained from another swine and that in both of the animals tuberculosis of the submaxillary and mesenteric lymph node developed. There was also visible a slight dissemination of the disease to the organs.

In the annual report [16] of the Bureau of Animal Industry, U. S. Department of Agriculture, for 1911 there occurs a brief account of tuberculosis occurring in hogs fed garbage from the kitchen of an asylum for the insane. Lesions from 6 animals were obtained for study and tubercle bacilli of the human type were demonstrated from 2, while in 4 hogs bovine tubercle bacilli were present.

The occurrence of tubercle bacilli of the human type in swine has been reported by several other investigators. Cobbett mentioned that the human type of tubercle bacillus had been found in swine in 4 instances. Butler and Marsch observed tuberculous adenitis in 26, or slightly more than 30 per cent, of 86 hogs in Montana that had been fed unsterilized garbage from a hospital in which a number of patients were

results were listed as "doubtful." Two pigs injected subcutaneously on one occasion with diluted sputum according to Dean and Todd showed only a localized tuberculosis after 100 days and 135 days respectively. When one considers that each swine in the series that Koch exposed to infection by ingestion received a total of more than 1.5 liters of tuberculous sputum, it is difficult to explain the failure of discernible lesions to develop.

affected with tuberculosis. By adequate laboratory tests tubercle bacilli of the human type were demonstrated in several of the lesions. Stein investigated the types of tubercle bacilli responsible for the lesions in lymph nodes removed from 2 garbage-fed swine slaughtered at Denver, Colo. From 1 case avian tubercle bacilli were identified, and from the other case human tubercle bacilli were obtained.

Holth reported 3 cases of tuberculosis in swine due to human tubercle bacilli in Norway, and Pallaske mentioned that 3 cases of tuberculosis in swine due to tubercle bacilli of human type had been observed at the Kaiserlichen Health Office in Germany. Topacio typed 11 strains of tubercle bacilli isolated from tuberculous swine in the Philippine Islands and all were apparently of human origin. Tobel, Schaaf, and Roza reported the occurrence of tubercle bacilli of the human type in swine in the Dutch East Indies; 4 of 5 strains isolated were of human type. Cornell and Griffith investigated the incidence of the different types of tubercle bacilli occurring in the lesions of swine in London. Submaxillary lymph nodes from a total of 103 pigs were studied and tubercle bacilli were demonstrated from 95. Subsequent studies of the 95 strains indicated that 63 were of bovine tubercle bacilli, 31 were of avian tubercle bacilli, and 1 was of human tubercle bacilli.

Recently (1938) Danbolt and Brandt reported on the types of tubercle bacilli in swine in the region of Rogaland, Norway. The lesions from 160 tuberculous swine were investigated and avian tubercle bacilli were found in 80 per cent of the cases. Tubercle bacilli of the human type occurred in 17.5 per cent and bovine tubercle bacilli in 2.5 per cent.

The data that have accumulated concerning the pathogenicity of the human tubercle bacillus for swine indicate that this microörganism is capable of infecting swine and that infection in most instances is introduced into the body by way of the alimentary tract. That garbage may at times contain tubercle bacilli seems to have been amply demonstrated. The presence of avian tubercle bacillli can in most instances be easily accounted for. Chickens affected with tuberculosis are not uncommonly dressed for food and the offal which frequently contains lesions of tuberculosis is usually disposed of by discarding it with the garbage. Unless such garbage is cooked, it constitutes a fruitful source of infection for other fowl and for swine.

The source of human tubercle bacilli in garbage probably is, in nearly all instances, infectious material from human beings affected with active tuberculosis. All uncooked garbage from tuberculosis sanatoria or from hospitals or private homes where tuberculous patients are cared for must be considered potential sources of tuberculous infection for swine. That apparently healthy food handlers may be sources of tuberculous infections is suggested by the report of Martin, Pessar, and Goldberg. By roentgenologic, sputum, and physical examinations these investigators found active pulmonary tuberculosis in approximately 2 per cent of presumably healthy food handlers in New York City. No doubt a large number of unknown and uncontrolled cases of active pulmonary tuberculosis exist in many large metropolitan areas. Expectorations and droplet infections from infected food handlers and patrons of public eating houses would of course be sufficient to provide possible sources of tuberculosis in swine-fed uncooked garbage. Other sources of tuberculosis of the human type of swine would be tuberculous employees of hog feeding establishments.

Swine affected with human tubercle bacilli are not necessarily a serious

hazard to human health provided the carcasses of such animals are subjected to a proper post-mortem examination by a qualified meat inspection service. Since the lesions in swine due to infection with the human tubercle bacillus are usually slight and localized and limited to one or several lymph nodes with no evidence of recent invasion of the systemic circulation, such carcasses are usually "passed for food" after the affected tissues have been removed. If the disease be severe and extensive the carcass is sterilized or condemned as unsuited for food.

It should be recognized, however, that lesions of tuberculosis in swine due to tubercle bacilli of the human type constitute a possible occupational hazard to slaughter-house employees and to meat inspectors. The latter especially are likely to come in contact with infectious material. Handling of diseased viscera and lymph nodes with the bare hands is a routine procedure and since the objective of the post-mortem examination is to discover evidence of morbid changes, the examination is carefully and thoroughly done. Manipulation of diseased tissues cannot be avoided, and the possibility for cutaneous infections exists.

Aside from the problem created in swine by infection with human tubercle bacilli the fact that such infections occur should be of interest to those concerned with the public health. If the dissemination of human tubercle bacilli is occurring in a community in sufficient numbers to produce tuberculosis in swine it is reasonable to believe that the source of such pathogenic organisms is a potential danger to other human beings. This thought should inspire an increased effort to search out subclinical cases of tuberculosis in order that the proper supervision may be exercised to prevent transmission of the disease to others who may be susceptible.

In this study the lack of certain pertinent data concerning the origin of the respective lots of swine precludes establishing definite proof that the tuberculous infections demonstrated were derived from the garbage that had been fed. The possibility that at least some of the infections were established before the period when the feeding of garbage was begun must be admitted. However, the likelihood of much of the infection being transmitted through the garbage seems a reasonable presumption.

SUMMARY AND CONCLUSIONS

In order to determine the types of tubercle bacilli in the lesions of tuberculosis in swine-fed uncooked garbage, a study was made of material obtained from a large metropolitan area. The total number of garbage-fed hogs examined at post-mortem examination was 264. Lesions of tuberculosis were established by the meat inspectors in 75, or 28.4 per cent. All lesions studied were those involving lymph nodes. By culture procedures and the inoculation of guinea pigs tubercle bacilli were demonstrated in 47. Subcultures were obtained of each of the 47 strains and the bacillary type of the respective strains was determined by tests for pathogenicity. Guinea pigs and rabbits were used. Thirty-five, or 74.5 per cent, of the strains were tubercle bacilli of the avian type, and 12, or 25.5 per cent, were tubercle bacilli of the human type.

The results suggest the following conclusions:

1. The failure in this study to demonstrate bovine tubercle bacilli appears significant and indicates the success achieved in eliminating tuberculosis from cattle.

2. It is probable that the garbage fed contained a considerable amount of offal from tuberculous fowl, indicating that tuberculous chickens are commonly sold for food.

3. It would appear that infective material from human beings affected with active

tuberculosis is not always properly disposed of, and that such material is a potential hazard to human health.

4. The presence in swine of tubercle bacilli of the human type constitutes an additional reason why unselected garbage should not be fed in an uncooked state to swine.

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Methods of Poultry Evisceration and Packing and Their Relation to Health

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ONE of the most important factors to be considered on the subject of recent methods of poultry evisceration and packing, and their significance to health, is that of post-mortem inspection of poultry at the time of slaughter, or prior to its being processed in a poultry canning plant. The inspection of poultry is not compulsory but is a service conducted under the supervision of the Bureau of Agricultural Economics, U. S. Department of Agriculture, and is available to interested poultry packers upon their voluntary application, and the payment of the cost of rendering the service to them. The importance and advantages of such inspection in the preparation of poultry for market is readily conceivable to the consumer and likewise to the many packers who utilize this service.

Since the time that poultry was produced and marketed as merely a by-product of the farm, there have been many changes. New methods have been employed in the breeding, hatching, raising, feeding, slaughtering, plucking, packaging, processing, storing, and transporting, through the channels of trade to the consumer, of this popular meat food product. These various changes have unquestionably been of great economic importance to the poultry industry and likewise have been an important factor in bringing to the family table a more palatable, wholesome, and healthful food.

A number of years ago little attention was given to the preparation of poultry for market; it was simply slaughtered at convenient times and marketed regardless of condition and quality. Today, much of the live poultry to be marketed is delivered to a central poultry feeding station where it is carefully graded for condition. Birds showing evidence of disease or sickness are usually destroyed at this time. After this individual handling of the birds, they are placed in wire feeding batteries and kept on a milk feed mash diet for approximately a week. During this time of special care and diet, the fibers of the meat become soft and of finer texture and much improved in flavor, and the birds make considerable gain in weight. As they are constantly watched by the feeders, any birds appearing to be in off-condition are immediately destroyed or isolated from the healthy birds. At the conclusion of the feeding period they are ready for slaughter.

The new methods of slaughter and dressing which are now employed are a great improvement over those which were used when all of the day's kill was immersed in the same tank of scalding water to make feather plucking easy. After slaughter and plucking, the birds are hung on racks in a

cooling room so that the animal heat will leave the carcass as quickly as possible. The following day they are graded into various classes according to weight and quality, packed usually 12 to a box, and stored in a freezing room at temperatures ranging from zero to below. This is the procedure which is generally followed in most of the poultry packing plants of today. As poultry is a seasonal product, it must be packed during the season of plenty and held under refrigeration to be marketed in the season of scarcity or at any time there is a favorable market for it.

Prior to 1928, little if any thought was given to the necessity of inspection of poultry. All poultry, whether fresh dressed, frozen, or prepared into canned products, was marketed and accepted by the consumer without inspection of any kind. About that time the New York City health authorities placed a regulation in their sanitary code prohibiting the sale of eviscerated poultry in that city unless it had been previously inspected and identified as such by an authorized agency which would be acceptable to them. This regulation particularly affected the packers of canned poultry products in that city, and they at once began to investigate the possibilities of federal poultry inspection; but since the Meat Inspection Act did not include poultry, it was not possible for the Bureau of Animal Industry to offer poultry inspection. However, an Act of Congress gave authorization to the Bureau of Agricultural Economics of the U. S. Department of Agriculture to inspect all perishable farm products including inspection and certification of dressed poultry for condition and wholesomeness. This was the beginning of a much needed service which was acceptable to New York City authorities. Interested poultry canners quickly applied for this service which made it possible for their products to bear the inspection legend of the U. S. Department of Agriculture, which reads as follows: "Inspected and Certified by Bureau of Agricultural Economics, U. S. Department of Agriculture." Since that time, other large cities have passed similar regulations prohibiting the sale of uninspected canned poultry products, the result of which is that practically all prominent packers of canned poultry in this country are preparing their products under federal supervision.

The packing of canned poultry products has developed into an industry of vast proportions and great quantities of poultry are processed yearly to produce a variety of products such as:

Chicken soup
Whole and half chicken in gelatine
Egg noodle and chicken dinner
Egg noodle and giblets dinner
Chicken a la king
Deviled chicken
Creamed chicken
Chicken hash
Boned chicken
Chicken a la Creole
Potted chicken
Chicken stew with vegetables
Chicken breasts with sauce
Chicken tamales in sauce
Chicken liver paté
Salad chicken
Chicken pot pie
Chicken giblets
Chicken liver spread
Chicken liver soup for babies
Sliced turkey with gravy

As I have previously pointed out that practically all prominent packers of canned poultry and poultry products utilize the poultry inspection service of the Bureau of Agricultural Economics, I shall attempt to describe the general procedure which is followed in the preparation of poultry for processing in a government inspected poultry canning plant.

The first requirement of government inspection is that the plant shall be of a construction that will meet satisfactorily all sanitary requirements of the

regulations. This means walls, floors, etc., constructed of impervious materials which can be easily kept clean by washing; properly trapped sewerage drains; ample natural light; sufficient artificial light for early morning or late evening operations; screened windows; proper ventilation; clean dressing rooms, and sanitary lavatories and toilets for all employees.

The equipment used for the inspection and evisceration of poultry consists of two electric motor-driven conveyor tables, one for inspection and the other for evisceration. These tables are similar to those used in the large packing-houses for small animals. They are a series of stainless steel or monel metal pans attached to a chain conveyor revolving over and under the table, and on each revolution on the underside of the table pass through a washing and sterilizing chamber.

After all pin feathers have been removed from the skin and the hair singed from the carcass, the birds are individually placed in the pans of the inspection table, and as they are carried along the line, plant employees open the abdominal and thoracic cavities to permit the federal licensed veterinary inspector to make inspection of all internal organs. Birds showing lesions of disease or otherwise unfit for consumption are condemned at this time. Fit and healthy birds are now ready for complete evisceration.

On leaving the inspection table, the head and feet are removed and the body of the carcass passed to the eviscerating table (which is similar to the inspection table except that it has stationary dressing units on each side, equipped with sprays of continuous running water). Here all entrails are removed, after which each carcass is conveyed to the end of the table to be immediately and thoroughly washed. These birds are now ready for further processing.

The duties of a veterinary dressed poultry inspector are not only to make post-mortem inspection of each and every bird, but also to see that the entire plant is kept in a sanitary condition at all times, that all processing is carried on under sanitary methods, that all ingredients other than poultry which have been included in approved formulae are of fit quality and of proper proportions, and that the finished product is labelled with only such labels as have been officially approved.

While large quantities of poultry are prepared and processed in canning establishments (and I want to commend the management of this great industry for the methods employed and the quality of poultry used in the producing of a convenient, nourishing, healthful, and palatable product), yet far greater quantities of poultry are prepared and consumed in hotels, restaurants, all kinds of eating places, and particularly in our homes. There are few of us who do not enjoy the meal at which poultry is served, whether it be broiled, fried, fricassee, or roast chicken, or a well browned stuffed turkey, goose, or duck.

Recognizing the fact that almost every home is a potential customer for their product, the dressed poultry packers are now preparing poultry for home consumption in a ready-to-cook fashion and there appears to be a steady and continued demand on the part of the consumer to purchase poultry which has been government inspected, fully eviscerated, washed, dried, and cellophane-wrapped and packaged under strict sanitary regulations. There is little doubt that in the not far distant future a great portion of the poultry produced in this country will be packed and marketed as a ready-to-cook product, and why not?

As I have stated previously, poultry is a seasonal product and, therefore, must be stored under refrigeration from

the season of plenty to the season of scarcity. There is, however, no good reason for holding in a refrigerating plant poultry that has not been previously eviscerated, the same as all other meat food products. The cost of storage and transportation is computed on a weight basis and, therefore, this service would be more economical and would lessen very much the possibilities of contamination and flavor of the product.

The consumer must necessarily become acquainted with the advantages of purchasing fully eviscerated and government inspected, ready-to-cook poultry. There can be no question as to its relation to health. In preparing this specially packaged poultry, only birds of top quality are used. They must be entirely free of pin feathers, they must be soft meated, and well fleshed, and some packers use only birds that will meet the specifications of U. S. Grade A.

The inspection of this poultry is conducted in the same manner as that of poultry for canning purposes. After inspection and complete evisceration and thorough washing by hand, each bird is then dried with paper towels and wrapped in cellophane. The actual net weight of the carcass is plainly marked on the package. All of these operations are conducted under rigid sanitary conditions, and the cellophane wrapping and sealing of the package protect the product from further contamination by handling.

It is necessary that this type of poultry be quickly and thoroughly frozen and kept in that condition until it reaches the consumer. Various types of quick-freezing methods are used and temperatures usually range anywhere from 10° to 50° below zero. In the past there has been some consumer prejudice to frozen foods and especially to poultry, but when one considers that all poultry which is packed in abundance has been frozen prior to being marketed, it is our opinion that the evisceration and inspection of poultry at the time of slaughter would be a distinct advantage to the industry as well as to the well-being and convenience of the consumer because it is packaged in various types of cellophane sanitary wrapping, and some classes of poultry such as broiling and frying chicken and fricassee fowl are dismembered in proper portions for serving at the table.

If the marketing of this type of poultry is to become successful, the purchaser must expect and accept its delivery to him in a hard frozen condition. The defrosting process is easily and quickly accomplished in the home.

Now in comparison, if the consumer is to continue to accept for home consumption defrosted uninspected poultry, the usual procedure of marketing this type of poultry is as follows. The retail merchant receives the greater portion of his poultry in a frozen condition and it is a common practice of the retailer to defrost the poultry entirely, as it then presents a more normal appearance and is more easily drawn. It is possible that in many instances birds are kept in a defrosted condition for several days before they reach the actual consumer. While being held in this condition, chemical action and decomposition take place, and the gases which form from the intestinal contents and food in the crop and gizzard permeate the flesh. This results in a strong flavor in the poultry, and there is also the possibility of the presence of disease as well.

Poultry consumed in the home is as a rule eviscerated by the butcher, who is not educated to detect the lesions of disease, and therefore could not very well pass on its fitness for food, as far as disease is concerned. In many instances, the work of evisceration of poultry in the retail market is done on the same cutting-board or chopping-

block where other meats are cut. There are usually considerable intestinal excreta and other fluids from the carcass smeared over the cutting-board, and if this filth is not immediately and thoroughly cleaned off, the next steak which is sliced off a loin of beef is likely to become contaminated to some extent. This practice indicates the desirability of poultry being delivered to the market fully eviscerated, after have been inspected, the same as other meat products. There are, of course, sanitary meat markets where a special workbench is provided for the handling of poultry.

As a matter of information concerning the quantity of poultry now being government inspected in the United States, there have been inspected during the period of a year 43,550,124 lbs., of which more than 743,777 lbs. were condemned as unfit for food. The causes for condemnation were various, such as avian tuberculosis, septicemia, emaciation, decomposition, pertitonitis, tumors, leukemia, abscesses, and other conditions, but avian tuberculosis by far exceeds all other causes for rejection of poultry as unfit for food. Poultry which has been condemned by the inspector as not fit for food purposes is denatured usually with crude carbolic acid or denaturing oil, or in many instances incinerated.

In conclusion, it would seem of great importance that the housewife particularly, who is greatly interested in promoting the health and well-being of her family, should insist, when making purchases of either canned poultry products or full eviscerated poultry, that it show identification of having been government inspected.

Typhoid Fever and Vegetable Juices (Carrot)

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THE importance of adequate supervision and control of food manufacturing and dispensing establishments was demonstrated in a recent investigation by the San Francisco Department of Public Health.

A case of typhoid fever was reported. The important facts are: V. T., age 40, a secretary, became ill. Clinical symptoms suggested typhoid fever, which diagnosis was confirmed in the laboratory. There was no evidence pointing to a source of infection outside of the city of San Francisco. The patient ate at home or at the homes of friends or relatives except for lunches, which were eaten at 4 food shops, but most frequently at one, a food store specializing in the sale of vegetable juices.

A second case of typhoid fever was T. N., age 22, a clerk in a large department store. The onset of symptoms was approximately on the same date as in V. T. Blood and stool cultures were positive for *E. typhosus*. This patient had limited his activities to the city of San Francisco, except for Sunday automobile trips to the country, on which food and water were carried from home. All meals were consumed at home, except lunch, which was taken at the same food store most often patronized by V. T.

DISCUSSION

The usual routine investigation of food handlers and the examination of food products that might have been a source of infection were carried out. Investigation including stool examinations of all known family contacts as well as the food handlers in the restaurants and the food store involved, was made.

The vegetable juices sold by the food store showed a high bacterial count. It was found that pasteurization of these juices had been incompletely carried out, or omitted, in violation of the regulations of the Department of Public Health, effective November 3, 1936.

The worker recently assigned to the direct preparation and handling of the vegetable juices was found to be a typhoid carrier. Stool specimens were positive for *E. typhosa* on 3 successive examinations. All other laboratory examinations were negative.

The typhoid carrier, C. K., age 40, had worked as a domestic in several families and gave a history of having had typhoid fever 34 years previously. She admitted that the vegetable juices had generally not been pasteurized.

LABORATORY STUDIES

A short series of studies in the labo-

ratory made clear the more essential points. A prolonged study is necessary, however, to provide a complete background for control work.

Freshly prepared carrot juice is a slightly acid product, pH 6.5 to 6.7. The bacterial content of fresh juice varies between wide limits, coming from the surface of the carrot and from the steps in processing. A perfect cleansing operation, in the surgical sense, followed by aseptic technic, should result in virtual sterility. Using elaborate precautions, however, a minimum count of 2,800 colonies per cc. was secured. The maximum count was 3,000,000 colonies per cc.

No standards exist with regard to bacterial colony counts as an index of sanitation, and it is questionable whether any satisfactory standard of this sort should or could be practically established. The results when elaborately careful laboratory preparations of juice were tested suggest strongly that the fluctuations in counts in juice from any given establishment would be so wide that differentiation between sanitary and unsanitary preparation on the basis of a colony count would not be proper. Emphasis must be placed on sanitary premises, on thorough cleansing operations at all points, and on personnel.

Pasteurization follows principles which have been firmly established. In no sense does pasteurization sterilize the juice which may, therefore, be expected to spoil. Both raw and pasteurized juices are excellent culture media for bacteria. The heating process, however, by reducing the number of living organisms and injuring others, induces a definite lag in spoilage. This lag may be real and may be helpful, but it should not be emphasized; juice still may spoil so rapidly that it is necessary to guard against a false sense of security. Spoilage is ordinarily indicated by decomposition, leaving a product wholly unpalatable. This is accompanied by some acidification (pH 4.5 or higher, depending on the juice and the conditions of holding). The acidity of fresh juice is not significantly altered by pasteurization. Pasteurization reduced the colony count materially in all cases but, due to the different flora and to minor variations in the heating process, much irregularity was observed. Reductions in count to 1/50 or 1/100 of the count on raw juice were usual.

The chief value of pasteurization is that it destroys pathogenic organisms and that it does this during the last stage of preparation. Experiments showed that coliform organisms were usually eliminated and always sharply reduced. Freshly isolated *E. typhosa*, liberally inoculated, in no case survived. The typhoid bacillus did not die in raw juice; *i.e.*, the juice itself does not kill this organism. Extended investigation would be needed to demonstrate conclusively that 140° F. for 30 minutes is not adequate and that 142° F. or 143° F. for 30 minutes would be preferable as a lower limit. This conclusion was suggested from the data secured, however, particularly if rapid cooling following pasteurization is practised.

Chlorination as such was not found to be satisfactory. Even with carefully scrubbed hands, with carrots immersed in chlorine, 200 p.p.m., and with the use of completely sterilized apparatus, the bacterial count was appreciable and spoilage was not greatly delayed. Chlorination is, of necessity, introduced at an early stage in a processing in which the later stages introduce the greater risk. The practical proof of the value of chlorine rinse of the washed carrot followed by extraction and pasteurization of the juice would be difficult due to the lack of suitable criteria for the measurement of the potential degree of effectiveness. The

action of chlorine, however, might be worth considering if standards are to be established, not as adequate by itself but as an additional step in the preparation of good juice for pasteurization. The bacteria are ground in and a casual washing process will not be offset by chlorine treatment. Examination of a carefully scraped carrot, rinsed in clean water, would inevitably show that more bacteria had been *removed*. Further investigation might show that, between improved cleansing and chlorine, the former would be preferable; but that, between the best practical cleansing operation without chlorine and with chlorine, the use of chemical aid might be worth while. No laboratory evidence has thus far been adduced to favor the use of chlorine at any stage.

COMMENT

The pertinent facts given above illustrate the necessity for very close, frequent, and careful supervision by health authorities over food establishments preparing and serving foods of any character, but particularly, as in this instance, unheated, or partially heated, extracts and juices from vegetables.

Specific orders of the Department of Public Health as to the pasteurization of such juices were apparently ignored or forgotten, with two cases of typhoid fever as a result.

Medical and Nursing Service

I WISH to voice a resentment to the implication that men and women in public service are any less worthy in education, in capacity, in attention, in interest, in devotion to duty, than those who are in what we call "'private life." I resent the imputation that a salary stultifies, that we must receive a fee for every service rendered or else perform it grudgingly or inefficiently or both. This is no more true of the medical and the nursing professions than it is of those who are by established custom paid for their services in this way. Granted a satisfactory standard of living, the remaining satisfactions are not those derived from monetary income, but from an appreciation of work well done.—Edward S. Godfrey, Jr., M.D., State Commissioner of Health, in address before the 1939 Annual Conference of Health Officers and Public Health Nurses, Saratoga, N. Y.

Outbreak of Staphylococcus Milk Poisoning in Pasteurized Milk

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A NUMBER of epidemics of staphylococcus toxemia from milk and related foods have been reported.[1-4] Some strains of *Staphylococcus aureus* secrete soluble exotoxins which give rise to acute attacks of diarrhea. A number of epidemics from this cause have been reported. The organism grows best in foods containing considerable carbohydrate. Cake, custard, eclairs, and milk contaminated by an abscess in a cow's udder have been incriminated.[5, 6] This report is made not because the condition is new or rare, but because the method of contamination is of particular interest, and because the milk, being pasteurized, was supposedly safe.

On Saturday morning of September 25, 1937, the Oklahoma Agricultural and Mechanical College Infirmary admitted 9 students between 10 o'clock and noon, having the usual symptoms of an acute gastro-intestinal intoxication, with varying degrees of severity — nausea, vomiting (some bloody), cramping, and diarrhea. These 9 persons ate their breakfast at three different places. A hasty check with private physicians of Stillwater revealed 3 cases at one other address —a total of 12 cases within 2 hours' time.

Again shortly after the noon meal, between 1 and 3 o'clock, 5 more cases were admitted to the college infirmary, all from one fraternity house, and 3 cases were reported by a private physician—a total of 8 cases from three houses within 3 hours after lunch.

No more cases were reported until Monday, September 27, (2 days later) when 4 more cases were admitted to the college infirmary and 5 more cases were reported by private physicians. This made a total of 9 cases for the day, from 4 different houses. These cases resembled very closely those of 2 days earlier.

Epidemiological investigation of all cases revealed one fact—all 29 had drunk varying amounts of milk produced by one local pasteurizing plant. Some had drunk milk, some used it on cereals, and one mild case used it only in hot chocolate. Other members of these families and boarding houses who ate at the same table but who did not use milk suffered no ill-effects whatever. In one case the husband used no milk for breakfast but drank milk for lunch from the same bottle from which his wife drank in the morning. He likewise became quite ill within 2 or 3 hours after lunch, as had his wife after breakfast.

The onset in most of the cases was approximately 3 hours after drinking the milk, but varied from 1½ to 7 hours. Other foods tested from places where several persons were ill revealed no toxic bacteria.

Remaining portions of milk were collected from the various places where

cases occurred and samples from the same bottles as those causing illness were tested and found to contain "potentially toxic staphylococci; no hemolysis; active zoning."

All milk causing illness is thought to have been pasteurized on Friday, September 24, 1937. Of the 9 cases occurring on the 27th, 5 are known to have drunk milk purchased from a fruit stand on Sunday afternoon, September 26, and left there the day before. The remaining 4 cases had delayed opening their milk over the week-end for various reasons.

Records of all pasteurizations from September 23 to 29 were examined. These showed that the pasteurization had been carried out properly. The phosphatase test revealed adequate pasteurization of all samples tested, including some of those which actually caused illness and from which staphylococci were cultured. These facts led us to believe that contamination occurred after pasteurization, for that process would have killed the organisms even though it might not have destroyed the soluble toxins.

Inspection of the pasteurizing plant revealed that equipment was in good condition but that it was not at all adequate in so far as safe and clean milk production is concerned. Cleaning and sterilizing equipment were found inadequate and bottling and capping were being done by hand.

Five employees of the plant were examined and 3 of these were found to have positive nose or throat cultures for "potentially toxic staphylococci." One of these persons had pustules on his face and body.

Cultures on raw milk samples from 6 producers for the plant revealed "potentially toxic staphylococci" in 4 of the 6 supplies; therefore work needs to be done on herds of producers as well as in the plant.[1, 7]

The actual method of contamination of the pasteurized milk must of course be more or less a matter of supposition, but it seems quite likely that it occurred in bottling and capping, either by contamination from hands, or by sneezing or coughing across a group of bottles.

SUMMARY AND CONCLUSIONS

1. The week-end outbreak consisted of a total of 29 cases from 11 different residences. All but 3 or 4 of the cases were able to leave the infirmary or care of their physicians the following day. These 3 or 4 remained in the hospital from 2 to 4 days, the reason being the extreme weakness following severe nausea, cramping, bloody vomiting, and bloody diarrhea.

2. "Potentially toxic staphylococci" were isolated from samples of milk causing illness and upon which the phosphatase test revealed adequate pasteurization; therefore contamination occurred after pasteurization.

3. "Potentially toxic staphylococci" were isolated from the nose or threat of 3 of the 5 employees of the plant, one of whom had numerous pustules on his face and body.

4. Contamination presumably occurred during the process of bottling and capping, which were done by hand.

5. Equipment at the plant, though in good condition was quite inadequate.

6. The plant in question sold its milk as "Grade *A* Milk," yet was not violating any of the provisions of the city ordinance in effect at that time. The U. S. Public Health Service Standard Milk Ordinance adopted a short time previously and to be put into effect the following January 1, 1938, contains provisions which make the combination of circumstances responsible for this outbreak quite improbable.

NOTE: I wish to express my appreciation to all those who rendered valuable assistance in stopping this outbreak, reporting cases, and locating the source. In particular I should like to mention among these Dr. W. C. Thompson, Director of the Student Health Service of the Oklahoma A. & M. College; Dr. M. R. Beyer, Epidemiologist, and W. J. Wyatt, Milk Specialist, of the Oklahoma Health Department; C. R. Millard, Sanitarian of the Payne County Health Unit; C. P. Peck, City Milk Inspector of Stillwater, Oklahoma, and the Laboratory of the Oklahoma Health Department.

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Health Department Personnel

THE funds for the courses given to our new personnel have all come from the federal government and it is proper that this should be the source. We have no assurance that the person so trained and educated will remain in the employment of New York State or one of its component municipalities. I am opposed to stipulating any such obligation on the part of the recipients or of the state. Not only is there some doubt in my mind as to the legality of such a stipulation, but it seems a most unwise requirement. To hold a person to a job against his will, against his best interests, can only lead to discontent and a disturbance of morale which may be more costly than the expense of education and training. He should be free and not a bondsman. On the other hand, this state and its municipalities should be free to seek personnel wherever the best qualified can be found, whether in this state or another, whether trained under our allotment or that made to another state. Parochialism has no more place in the government service, especially the public health service, than it has in commerce and industry. If the public really wants a comparable efficiency, it must grant government a comparable freedom in the selection of those who are to serve it.—Edward S. Godfrey, Jr., M.D., State Commissioner of Health, in address before the 1939 Annual Conference of Health Officers and Public Health Nurses, Saratoga, N. Y.

A Comparison of MacConkey's Broth and Standard Lactose Broth as Media for Detection of Coliform Organisms in Water

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SINCE the first year of the 20th century the name of Alfred MacConkey has been closely linked with the development, in England and many other parts of the British Empire, of bacteriological methods of water analysis. It was in 1901 that MacConkey and Hill, following earlier research by the former on the use of bile salts for the differentiation of certain groups of bacteria, published a paper entitled, "Bile Salt Broth. A Simple Test for Faecal Contamination."[1] Their suggestion of the use of bile salts in sugar broth for facilitating the search for coliform organisms in water met with immediate favor, and was soon adopted by the great majority of British bacteriologists. To this day bile salts have remained in British practice an indispensable ingredient of the primary medium employed for detection of the presence of coliform organisms in water, sewage, milk, and a variety of other materials.

The original formula of MacConkey broth, however, is not exactly that which is in use today. The earlier bacteriologists, recognizing the fact that many enteric disease organisms ferment glucose but not lactose, quite naturally concluded that the fermentation of glucose offered the best primary indication of the presence in a water of organisms associated with dangerous pollution. The same predilection for glucose in enrichment media is evident in the formulae for glucose broth employed at that time by American bacteriologists, but before long it was realized that the glucose fermenting group includes a vast number of organisms which do not compare with the lactose fermenters as pollution indicators, and gradually the glucose of MacConkey broth was displaced by lactose. Similarly, on this side of the Atlantic, the glucose broth employed as primary medium was superseded by lactose bile.

This substitution of lactose for glucose constitutes the only important modification that the original MacConkey broth formula has suffered. It is interesting to compare, for example, this original formula with that used today by the Metropolitan Water Board of London.

One other, but minor modification has been rather generally accepted. Following the suggestion of Savage,[2]

Original MacConkey

Sodium taurocholate	5 gm.
Glucose	5 "
Peptone	10 "
Water	1,000 cc.
Litmus	to give distinct color

Metropolitan Water Board

Sodium taurocholate	5 gm.
Lactose	10 "
Peptone	20 "
Water	900 cc.
Litmus	100 cc. 0.5% solution

neutral red is often substituted for the litmus of the formula, not only because neutral red is a more satisfactory indicator of acid fermentation but also because many coliform organisms produce, in a glucose or lactose medium containing it, a fluorescence that furnishes additional evidence of their presence. The formula recommended in the revised edition (1939) of *Report No. 71,* published by the Ministry of Health,[3] which constitutes, for all practical purposes, the British equivalent of the bacteriological section of *Standard Methods of Water Analysis,*[4] includes this usual modification.

MacConkey broth is employed in fermentation-tubes as a primary enrichment broth, just as is standard lactose broth in the United States and Canada. It must be noted, however, that, unlike standard lactose broth, the ingredients of which are so chosen as to favor the multiplication of the greatest possible number of varieties of coliform organisms, MacConkey's broth, because of its bile salt content, is rather a *selective* medium: the purpose of the bile salt is to inhibit non-coliform organisms, and to favor the multiplication of the so-called fecal type of coliforms (indol positive, methyl red positive, Voges-Proskauer negative, citrate negative). Because of this selectivity, it appears that the multiplication of some coliform types may likewise be inhibited, particularly that of certain slow lactose fermenting aerogenes organisms.

Nevertheless, partly because coliform organisms of the "fecal" type constitute a large proportion of the coliform flora of Britain's waters compared with that encountered in the waters of some other countries, and partly because English bacteriologists have consequently stressed the importance of a search for the more typical *Escherichia coli* of the coliform group, MacConkey broth has easily held its place in British laboratory practice. Apparently, in Britain, gas in MacConkey broth nearly always indicates the presence of coliforms; *Report No. 71* of the Ministry of Health[3] contains, for example, this statement:

> It is true that the bile salt has a slight inhibitory effect on the growth of the coliform organisms themselves, but this disadvantage is more than outweighed by the practically complete elimination of false positive reactions. With very few exceptions it may be taken that the production of acid and gas in MacConkey medium inoculated with water indicates the presence of coliform bacilli. Since the conclusive proof of this can be brought only by further tests, a reaction of this sort is generally referred to as a "presumptive positive coliform reaction." The presumption is, *in this country,* however, very high. In other countries, where the water flora is different, false positive reactions in this medium may not infrequently be encountered.

MacConkey broth has never been very generally employed in America. Although the principle of the use of bile ingredients in media has often been proposed here, whole bile (oxgall) instead of bile salt has usually been specified. The chief reason for this preference for whole bile has been an uncertainty regarding the composition of the commercially available "bile salt." There exist, apparently, no generally accepted specifications for the manufacture of this ingredient. English directions for the preparation of MacConkey broth usually designate a par-

ticular supply house or supply houses as the source of the bile salt to be used. Since no control is exercised to insure uniformity of composition of the bilt salt sold by different firms, variation in the characteristics of media prepared with different brands of bile salt is to be expected. Even some 15 years ago Sir Alexander Houston, in his *Nineteenth Annual Report to the Metropolitan Water Board* (1925), voiced this complaint:

> In pre-war days there were two simple tests of real value: (a) the number of bacteria growing at 37° C. in an agar lactose bile-salt medium, and (b) the gaseous fermentation at 37° C. of liquid lactose bile-salt cultures. The chief reason why these two tests were of such value was the selective character (in favour of *B. coli*) of the bile-salt (introduced by MacConkey). Since the war all the samples of bile-salt that have been tried in the Metropolitan Water Board Laboratories have proved most disappointing in this selective sense, and this, the writer thinks, is common experience. In the old days the presumptive evidence afforded by, at all events, test (b) was so valuable that confirmatory tests seemed almost unnecessary. Now test (a) is almost valueless and implicit reliance cannot be placed on test (b).

Similar complaints have been expressed by other English laboratory workers; and the author has noted marked variations in the characteristics of media prepared with the "bile-salts" furnished by different American firms.

At present, the bile salt usually employed in Britain is designated as "Commercial Sodium Taurocholate" which is supplied by commercial chemists under the name of "sodium tauroglyco-cholate."[5] The Metropolitan Water Board Laboratories, however, purchase Merck's brand, sufficient material of any one particular batch being prepared by the manufacturer to suffice for a year in order to obtain standard results over that period.[6]

It is obvious that the lack of more or less rigid specifications for the production of the bile salt to be used in MacConkey's medium constitutes an unsatisfactory situation. British laboratory workers are fully aware of this fact, however, and it is probable that before long they will adopt specifications to insure uniformity of composition of this important ingredient.

EXPERIMENTAL

Occasional inquiries, by American water bacteriologists, regarding the comparative utility of MacConkey broth and standard lactose broth for examination of waters on this continent have led the Committee on Standard Methods to undertake a study of these media. The following four laboratories, two engaged in the control of city purification plants and two state or provincial laboratories, exercising control of waters from a variety of sources, agreed to collaborate in the work.

City of New York—Mt. Prospect Laboratories
F. E. Hale and H. F. Muer
City of Toronto—Centre Island Laboratories
N. J. Howard and R. E. Thompson
State of Maryland—Dept. of Health Laboratories
C. A. Perry and A. A. Hajna
Province of Quebec—Ministry of Health Laboratories
M. H. McCrady and J. Archambault

The New York City samples consisted of raw and treated surface waters; those of Toronto were largely raw, slow sand filtered and drifting sand filtered waters together with a few chlorinated (finished) waters; the Maryland samples included various raw, coagulated, filtered and finished surface waters; whereas the Quebec samples were from springs, wells, lakes, streams and filtration plants, with well (surface and deep) and spring samples predominating.

The routine procedure adopted for this study was as follows:

1. Plant 5 portions of 10 cc. each and 5 portions of 1 cc. each of the sample in standard lactose broth and similar amounts in MacConkey broth.

2. Incubate at 37° C. for 48 hrs.

3. As soon as gas appears in any tube, confirm completely according to *Standard Methods of Water Analysis* (EMB plate, secondary lactose, agar slant, Gram-stained preparations, etc.)

4. As soon as gas appears in a lactose broth tube, in addition to the complete confirmation specified in (3), transfer 1 loopful of the culture to brilliant green bile; incubate the latter at 37° C. for 48 hrs.; and as soon as gas appears in the tube, confirm completely as in (3) above.

These procedures permit comparison of 5 methods of examination:

a. Standard Method with complete confirmation via lactose broth

b. Standard Method with complete confirmation via brilliant green bile

c. Standard Method with confirmation (production of gas only) by brilliant green bile

d. MacConkey broth presumptive test (production of gas only)

e. MacConkey broth method with complete confirmation

The brilliant green bile procedure was included because of the widespread interest in the favorable results secured by this means of confirmation in the course of a previous coöperative study.[7]

The brilliant green bile (2 per cent) and eosin-methylene-blue (both in dehydrated form), the lactose, peptone, and neutral red employed were furnished through the courtesy of Difco Laboratories, Detroit, Mich. "Sodium Taurocholate" was purchased from Baird and Tatlock, London, England (one of the firms suggested as furnishers of this ingredient by Dr. W. M. Scott, of the Ministry of Health, who also informed the author that "Bacto" products such as peptone, agar, lactose, and neutral red would be regarded there as suitable for the preparation of the media listed in *Report No. 71*).

The MacConkey broth used was made according to the formula and directions of *Report No. 71,* given below; double strength broth, in 10 cc. quantities, was employed for the inoculation of 10 cc. portions of sample, single strength broth for smaller portions.

Commercial sodium taurocholate	5 gm.
Lactose	10 "
Peptone	20 "
Sodium chloride	5 "
Distilled water	1,000 ml.

Directions for preparation: "Steam for 2 hours and transfer to the ice-chest overnight. Filter in the morning through Chardin paper while still cold. Adjust the reaction to pH 7.4, using phenol red as the indicator. Add about 10 ml. of 1 per cent aqueous solution of neutral red and sterilize in the autoclave at 10 lb. for 15 minutes, or in the steamer for 30 minutes on 3 successive days. The finished medium should be clear and should have a claret red color, free from yellow or magenta."

The use of eosin-methylene-blue agar, instead of MacConkey agar, for plating-out from fermentation tubes, constituted a departure from British practice, but since there seemed to be no reason for believing that E.M.B. agar was inferior to the other, and since most workers here are much more familiar with the former than with the latter medium, the departure appeared to be justified.

It may be noted, in this connection, that Atkinson and Wood,[8] working with Australian waters, succeeded in completely confirming 296 of 614 presumptives with the aid of E.M.B. agar, and only 277 by using MacConkey agar, despite an unusual practice of fishing mixed growths on MacConkey agar to fermentation tubes and again plating on MacConkey agar. It must be admitted, however, that absolutely identical results may not be secured from the use of MacConkey agar and that of E.M.B. agar.

RESULTS

The results obtained by means of the 5 different methods employed are shown in Table I.

It will be observed that, in the aggregate, the number of coliform isolations was about the same whether Mac-

TABLE I

Results of 5 Different Methods of Examination of Water Samples *

	No. of Samples Producing Gas in One or Both Primary Media	MacConkey Broth Primary Tubes			Lactose Broth Primary Tubes					
		Presumptives Gas +	Coliform Isolations		Presumptives Gas +	Coliform Isolations		Br. Green Confirmation		
			No.	Per cent				Gas	Coliform Isolations	
New York City	96	217	131	60	367	132	(12)	141	115	(6)
Toronto	30	134	82	61	137	92	(8)	127	98	(2)
Maryland	22	94	92	98	124	92	(1)	87	86	(1)
Quebec	73	406	326	80	442	327	(34)	359	335	(8)
		851	631	74	1,070	643	(55)	714	634	(17)

* Figures in parentheses indicate the number of tubes showing gas from which no coliforms were isolated, but from the corresponding lactose broth primary of which, coliforms were isolated by the other method. Thus, the indication (6), at the end of the first line of the table, signifies that 6 of the 141 gas positive brilliant green confirmatory tubes failed to yield coliform upon attempted isolation, but coliforms were isolated directly from the corresponding 6 lactose broth primary tubes.

Conkey broth, lactose broth, or lactose broth followed by secondary brilliant green bile was employed. Toronto's coliform isolations by means of these 3 media, however, numbered 82, 92, and 98 respectively, the use of MacConkey broth resulting in a loss of 16 per cent of the number of coliform isolations secured through the use of lactose broth followed by transfer of gas positives to brilliant green bile. Quebec's results are somewhat similar, although here the loss due to the use of MacConkey broth was only about 3 per cent. New York and Maryland, on the other hand, isolated the same number of coliforms from MacConkey broth and lactose broth, the use of brilliant green bile secondary resulting in a loss of 11 per cent and 7 per cent, respectively, of the isolations obtained directly from the other two media.

A comparison of the number of MacConkey presumptives with the number of coliforms isolated from them shows very clearly that in at least 3 of the 4 laboratories gas in MacConkey broth cannot be relied upon as an indication of the presence of coliform organisms detectable by the routine complete confirmation procedure; for from a total of 851 MacConkey presumptives only 631, or 74 per cent, were shown to contain coliforms. Apparently the coliform flora of the waters examined by 3 of the laboratories differs considerably from that of British waters.

On the other hand, although, as already indicated, about as many coliform isolations were secured from the MacConkey presumptives as from the lactose broth presumptives, the former numbered only 851 whereas there were 1,070 of the latter. In other words, 219, or nearly 20 per cent, fewer presumptives had to be confirmed when MacConkey broth was employed.

It is interesting to compare this experience with that encountered in an earlier study [7] of the relative utility of fuchsin broth and lactose broth primary media. The data requisite for such a comparison are shown in Table II. The results obtained from the use of confirmatory brilliant green bile are included.

Section A of Table II shows the results of examination of 890 water samples (1936–1937 series) by means of 3 procedures: fuchsin broth primary with complete confirmation; lactose broth primary with complete confirmation; and lactose broth primary followed by brilliant green bile secondary, with complete confirmation of the latter. In Section B are

TABLE II

A. Results from Examination of 890 Water Samples (1936–1937 Series)

		Presumptives		Coliform Isolations		
		No.	Per cent of LBP Presumptives	No.	Per cent of Positive Presumptives	Per cent of LBP + SMC Isolations
Fuchsin Broth	(+ SMC)	2,903	69.1	2,048	70.5	97.06
LBP	(+ SMC)	4,204	100.0	2,110	50.2	100.00
LBP + BG	(+ SMC)	2,384	56.7	2,079	87.2	98.53

B. Results from Examination of 221 Water Samples (1938–1939 Series)

MacConkey Broth	(+ SMC)	851	79.5	631	74.1	98.13
LBP	(+ SMC)	1,070	100.0	643	60.1	100.00
LBP + BG	(+ SMC)	714	66.7	634	88.8	98.60

SMC = Standard Methods Complete Confirmation Procedure (Agar plate, 2nd Lactose, Agar slant, Gram stain, etc.)
LBP = Lactose Broth Primary
BG = Brilliant Green Bile employed for confirmation of Lactose Broth Primary

given the results of examination of the present series of samples by using the same 3 procedures except that MacConkey broth has been substituted for fuchsin broth.

It will be observed that, when fuchsin broth was employed, the number of presumptives to be confirmed was only 69.1 per cent of the number of lactose broth presumptives, although the number of coliform isolations obtained from these fuchsin broth presumptives was 97.06 per cent of the number obtained from the lactose broth presumptives. The corresponding proportions, when MacConkey broth was employed in the later series of samples, were 79.5 and 98.13 per cent. Evidently greater economy of effort, with respect to the proportional number of presumptives to be confirmed, resulted from the use of fuchsin broth in the first series of examinations, than with MacConkey broth in the second series, despite the fact that coliform organisms were isolated with greater facility, at least from lactose broth presumptives, in the latter series (probably because of the larger proportion of typical coliforms, derived from raw and unfinished waters, contained in the second group of samples).

It will also be noticed that the percentages of fuchsin broth and MacConkey broth presumptives that yielded coliform isolations did not differ greatly (70.5 and 74.1), and that the ratios of recoveries from brilliant green bile secondary to those from lactose broth directly were almost identical for the two series (98.53 and 98.60 per cent).

It appears, therefore, that from the figures for the aggregate results secured from these 2 series of examinations, fuchsin broth yielded results practically as satisfactory as those obtained from the use of MacConkey broth. Both media, compared with lactose broth, were of some value in reducing the number of presumptives to be confirmed, although they permitted about as many coliform isolations as did the standard medium. Whether they would prove to be as satisfactory for the examination of finished waters is a question; because of the few coliform organisms contained in finished waters, only the results from a very large number of samples of such waters can determine definitely the effect of the inhibiting agents employed in these media. In any event, presumptives in either fuchsin or MacConkey broth must be confirmed, for when used for examination

TABLE III

Number of MacConkey Presumptives, Secondary Brilliant Green Bile Gas Positives and Coliform Isolations from Lactose Broth

	MacConkey Presumptives (Gas +)	*Secondary Brilliant Green Bile (Gas +)*	*Coliform Isolations from Lactose Broth by Complete Confirmation of Lactose Broth or Brilliant Green Bile Gas Positives*
New York	217	141	142
Toronto	134	127	100
Maryland	94	87	93
Quebec	406	359	361
	851	714	696

of American waters, they have not proved generally satisfactorily indications of the presence of coliform organisms.

On the other hand, it is evident from Table III that the presence of gas in brilliant green bile, following transfer from a lactose broth tube in which gas has been produced, indicates fairly accurately the presence of coliform organisms except in the Toronto laboratory where, of 127 brilliant green bile gas positive tubes, only 100 were shown (by confirmation directly from the primary lactose broth or indirectly from the brilliant green bile) to represent lactose broth primary tubes containing coliform organisms. It is probable, however, that a more intensive search would have shown the presence of gas in brilliant green bile to be a somewhat more reliable indication of the presence of coliforms in these Toronto waters than that furnished by these figures, for a varying proportion of coliform organisms usually escape the routine complete confirmation procedure.

The results secured from this comparison of MacConkey broth and lactose broth are somewhat similar to those reported by Atkinson and Wood [8] in Australia. Working with untreated waters from various sources, they planted 5 portions of each of 3 dilutions of 34 different samples into the 2 media, confirming completely in accordance with American methods (except in the use of MacConkey agar instead of E.M.B. or Endo agar) all tubes in which gas was produced. The results were as follows:

MacConkey Broth		*Lactose Broth*	
Presumptives	Confirmed	Presumptives	Confirmed
216	174	305	247

With both media, 81 per cent of the presumptives were successfully confirmed. But lactose broth yielded 42 per cent more coliforms than did MacConkey broth; and in 27 of the 34 samples examined, the coliform count resulting from the use of lactose broth was the greater of the two. The authors conclude: "Thus the British Standard Method using MacConkey broth without confirmation is not suitable for the examination of the type of water tested here, on account of the inclusion of false positives and the lack of sensitivity of the medium to the coliform group"; and they state that the method adopted for bacteriological analysis of Victorian drinking water is practically that given by the American Public Health Association (1933).

CONCLUSIONS

A limited study of the relative utility of MacConkey broth and lactose broth as primary media and of brilliant green bile as a confirmatory medium was undertaken by 4 different laboratories. The results may be summarized as follows:

1. The MacConkey presumptive (presence of gas within 48 hrs.) did not prove to be, in general, a satisfactory indication of the presence of coliform organisms. False presumptives (or at least presumptives from which such organisms were not isolated by means of the usual complete confirmation procedure) constituted 2, 20, 39, and 40 per cent of all MacConkey presumptives encountered by the Maryland, Quebec, Toronto, and New York laboratories respectively.

2. Complete confirmation of MacConkey presumptives yielded about as many coliform isolations as did like confirmation of the larger number of lactose broth presumptives, or of brilliant green bile confirmatory gas positives. The economy in number of presumptives to be confirmed obtained through the use of MacConkey broth, however, did not appear to surpass that which was secured, in a previous study, through the use of fuchsin broth. The effect of the inhibiting agents employed in these two media upon coliform organisms that may be contained in finished waters has yet to be determined.

3. On the whole, the procedure employing lactose broth and confirmation (gas only) in secondary brilliant green bile appeared to yield more satisfactory results than the other procedures. In the Toronto laboratory, a number of false positives were encountered in brilliant green bile as well as in MacConkey broth; but there also the procedure employing brilliant green bile, whether or not followed by complete confirmation, proved to be as satisfactory, or more satisfactory than that in which MacConkey broth was used.

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OUR SIXTY-EIGHTH ANNUAL MEETING

THE 68th Annual Meeting of our Association was held in Pittsburgh, Pa., that center of industry which is one of the wonders of the world. It is the first time that we have ever met in that great city, and it has been 42 years since we have met in Pennsylvania. Having been in Pittsburgh once, we fear that we will not be satisfied anywhere else. Registration went well over 2,400.

We had some foreboding about attendance owing to the European war. This led to a number of cancellations especially from our constituent and sister country, Canada; but things have turned out better in regard to attendance from that country than we dared to hope since at least 19 representatives met with us.

Canada:

Robert D. Defries, M.D., D.P.H., Toronto, Ont.
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Norman MacL. Harris, M.B., Ottawa, Ont.
Donald T. Fraser, M.B., D.P.H., Toronto, Ont.

From another constituent country, Mexico, two representatives:

Angel de la Garza Brito, M.D., C.P.H.
Alberto P. Leon, M.D., M.P.H.

From Cuba five honored us:

Dr. Gaspar Agramonte, Cuban Navy, Havana
Dr. Moises Chappotin, Cuban Army, Havana
Raoul Cowley, Marianao, Cuba
Dr. Alberto Ricio, Cuban Epidemiologist, Havana
Dr. Charles Finlay

We were happy to have Dr. Agramonte, a nephew of Dr. Aristides Agramonte who was on the famous commission with Walter Reed; also Dr. Charles Finlay, son of Dr. Carlos Finlay who made experiments in regard to yellow fever and who furnished Walter Reed the eggs from which he reared his mosquitoes and got his final proof.

We had a number of engagements from our honorary members in England, but all of these had to be cancelled. However, we were fortunate in having from Finland, a county health officer, Dr. Niilo Erkki Leppo, and his wife. From Puerto Rico, Dr. Oscar Costa-Mandry; Japan, Dr. Takemune Soda, Assistant Professor, Faculty of Medicine, Taihoku University, Formosa, Japan; Hawaii, Mr. Robert Lam, Honolulu Health Department, and Thomas O. Frazier, Honolulu Health Department; Alaska, Marcia S. Hays, M.D., Juneau; Virgin Islands, Dr. Norman R. Sloan. There were a number of most interesting trips for which transportation was furnished by the Local Committee.

The scientific exhibits were somewhat limited owing to the lack of space. Without being invidious, we want to mention that among the best exhibits were that from Kips Bay-Yorkville Health Center of New York City, most cleverly constructed, showing the value of a preventive diet, and the Pittsburgh Industrial Health exhibit. The commercial exhibit was excellent in every respect.

The scientific program was unusually rich, so much so that one could not but wish for at least a dozen bodies to attend as many meetings simultaneously.

Needless to say the principal features were the meetings on Tuesday and Thursday evenings. At the first on Tuesday, we were graciously welcomed by Mayor Cornelius D. Scully, the Health Officer, Dr. I. Hope Alexander, and the president of the local medical association as well as other local organizations. We will not comment on the president's address as that will appear in December. Among the features was the Delta Omega lecture which initiated a series which it is to be hoped will be continued, followed by the presentation of the Sedgwick Memorial Medal. This was followed by a reception to President and Mrs. Abel Wolman and to President-elect Dr. and Mrs. E. S. Godfrey, followed by dancing, altogether a most enjoyable occasion. The banquet on Thursday night was all that could be asked for. The presentation of forty year membership certificates to Dr. Norman McLeod Harris and Mr. John Watson Alvord was made, and the Health Conservation Contest awards were announced, followed by dancing on the Urban roof which again gave great pleasure.

As usual there were a number of advance meetings of related or affiliated organizations besides the Sixth Health Education Institute, all of which were well attended. Of special interest was the meeting of the Pennsylvania Public Health Association with the Tri-State Food and Health Officials. Following a joint banquet, a very large gathering was addressed by Dr. Henry F. Vaughan and the Honorable Fiorella H. LaGuardia, Mayor of New York City.

Too much cannot be said of the courtesies of the Local Committee. Everything was done for the comfort and entertainment of everyone. A special feature,

new in our experience, was the lovely flowers furnished by the Women's Entertainment Committee, under the chairmanship of Mrs. David B. Ludwig, for all occasions and changes of floral decorations for all public meetings.

DENTAL FLUOROSIS AND DENTAL CARIES

FOR some 8 or 9 years past the presence of fluorine in water supplies has been attracting much attention, chiefly as a danger and as the cause of endemic dental fluorosis, or mottled enamel, which has been reported in some 300 communities in 23 states of the Union.

According to Dean,[1] this condition was first described by J. M. Eager[2] in a report from Naples under the name "Denti di Chiaie (Chiaie teeth)," so called from Dr. Stephano Chiaie, who first observed the condition in Italy, where it was ascribed to volcanic fumes in the air or dissolved in drinking water. Italian immigrants not infrequently consulted doctors in this country for the condition, which was "unlike any other dental disease."

Apparently nothing was done until 1916, when Black and McKay[3, 4] published a series of articles on the subject, Black describing it as "An Endemic Developmental Imperfection of the Teeth, Heretofore Unknown in the Literature of Dentistry." From that time until about 1932, the condition does not seem to have attracted much general attention. However, Black observed at that time some apparent relation between mottled enamel and dental caries. Other observations along this line were not abundant, but intensive work has been going on for 5 or 6 years, notably in the National Institute of Health and in some western states.[5]

The condition has been proved to be due to the use of water carrying toxic amounts of fluorides during the period of dental calcification. However, evidence has accumulated which indicates that a certain amount of fluorine in the water exercises some inhibitive action against caries, or, at least, that there is an inverse relationship between endemic dental fluorosis and dental caries. Many factors are involved but the careful plan followed in the study discussed here seems to have eliminated as many as possible of these.[6]

The four cities of Macomb, Quincy, Galesburg, and Monmouth, located near together in the flat country of North Central Illinois, were selected for comparison, and the examinations were limited to white children 12, 13, and 14 years old. The population in these four towns is very similar and they have approximately the same percentage of native white inhabitants—88–97. The location insures comparatively equal sunlight intensity.

In Galesburg and Monmouth the water supply contains from 1.7 to 1.8 parts per million of fluorides, whereas that of Quincy and Macomb has only 0.2 parts per million. Of 319 children in Galesburg and 148 in Monmouth, the number of carious permanent teeth per 100 children was 201 and 205 respectively, whereas of 112 children in Macomb and 306 in Quincy, the carious teeth were 401 and 633 respectively. There was twice as much dental caries in Macomb and more than three times as much in Quincy, where the water was practically free from fluorides, as at Galesburg or Monmouth. About 35 per cent of children examined in Galesburg and Monmouth were free from caries, while in Macomb and Quincy only 14 and 4 per cent respectively were free.

Another test was observation of interproximal, or smooth surface, caries for which the four superior anterior teeth of children who had used the city water supplies continuously throughout their lives were selected. In Galesburg and Monmouth, 2,718 surfaces examined showed an average of 0.59 carious lesions per 100 surfaces, whereas of 2,814 surfaces of children in Quincy and Macomb, there were 8.9 carious lesions per 100 surfaces, or 16 times as much.

An unusual feature of this investigation concerns the presence of *Lactobacillus acidophilus* which is believed by many to be a dependable index of the dental caries activity. Such examinations were made only at Quincy and Galesburg, where caries in permanent teeth amounted to 636 per 100 children in Quincy, 3.4 times the amount found in Galesburg, 189 per 100. The percentage of all acidophilus counts of 30,000 or over is also 3.4 times as high in Quincy as in Galesburg, possibly a coincidence, but an interesting finding in this general study.

This report, which does not pretend to be final, holds that from the epidemiological standpoint the difference in the water supplies must be considered the cause of the differences in the dental condition of the children examined. This points to the possibility of at least partial control of dental caries through the public water supplies. All studies of dental caries should be accompanied by complete chemical analyses of the domestic waters used, especially with regard to the comparatively rare elements.

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5. Smith, Margaret Cammack. *A.J.P.H.*, June, 1935.
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THE TOXICITY OF SELENIUM

IN a recent article [1] attention was called to the problem of selenium poisoning, the danger from which seems to be increasing through the use of spraying, irrigation, and certain industrial practices. While we know little of selenium poisoning in human beings, the deleterious effects on livestock and poultry have been proved.

The question has been under study at the National Institute of Health for some time. Their latest report [2] is of great interest as showing the relation between the composition of the diet and the danger of poisoning. In all of their experiments a prominent characteristic of selenium poisoning has been in evidence; namely, the great variation in individual as well as in species susceptibility. Many experiments have been made in trying to find the cause of this. It now seems certain that as far as rats go the toxicity of selenium taken in food is largely determined by dietary factors. A quantity of selenium which proves highly toxic and damaging to the tissues when given in a diet low in protein and high in carbohydrate is only slightly or not at all harmful when fed in another diet high in protein and law in carbohydrate. In other words, all the available evidence indicates that the toxicity of naturally occurring food selenium is determined to a great extent not so much by the level of intake of selenium, as by the ratio between protein and selenium in the diet. While 10 parts per million of selenium, a ratio of 1 per cent protein in the diet to about 30 micrograms of

selenium per 100 grams of diet, is of very low, if any, toxicity, a ratio of 1 per cent protein to 100 micrograms selenium per 100 grams of diet under the same conditions is dangerously toxic. A diet low in protein and high in fat shows some protective action against selenium poisoning, probably due to the protein sparing action of the high fat content.

Is it possible that these findings may help to explain the lack of cases of poisoning from selenium in human beings?

REFERENCES

1. Manville, Ira A. The Selenium Problem and Its Relationship to Public Health. *A.J.P.H.*, 29, 7:709 (July), 1939.

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BOOKS AND REPORTS

Fundamental Principles of Bacteriology with Laboratory Exercises—*By A. J. Salle. New York: McGraw-Hill,* 1939. 679 pp. Price, $4.00.

The author states that this book has been designed for those beginning the study of bacteriology and particularly those who intend to specialize in it. It is a "textbook on fundamentals." It differs from others in that it is written as a combination textbook and laboratory manual, the experimental portion being woven into the manuscript under the proper chapters. "The textbook material goes hand in hand with systematically arranged laboratory procedures." The experimental material has been designed to meet the fundamental requirements of students not only in bacteriology but in "the various divisions of agriculture, forestry, home economics, sanitary engineering, physical education, hygiene, public health, etc.," and this is expected to be covered in a one semester course.

It can be seen from what the author says that his outlook is ambitious. To a large extent he has succeeded in his objective and has produced a useful book, especially as a reference. We fear that much of the material is heavy for an elementary course while in other respects it is not complete enough for the specialist. It is presupposed that the student will have a wide knowledge of inorganic and organic chemistry and there is much greater emphasis on chemistry than is found in other textbooks. While all knowledge is useful and one hesitates to criticise on this ground, it must be pointed out that the book is crowded throughout with difficult chemical formulae, many in graphic form. It is a question of proportion. Under protein decomposition, 8 solid pages are given to chemical formulae, under classification of enzymes 13 pages, under biological strains 5 pages. There are 8 pages given to the preparation of stains and solutions and 10 pages to formulae and directions for making culture media.

The book is well written and clear. It can be recommended for reference but we doubt if it is well adapted for courses as usually given in any schools, medical, agricultural, or others, hence its adoption would necessarily lead to reorganization of instruction.

We like particularly the first two paragraphs of the Preface quoted from John R. Wilbur, which states what a preface should be as against what it usually is. The illustrations are abundant and the make-up is good.

MAZŸCK P. RAVENEL

An Introduction to Modern Statistical Methods—*By Paul R. Rider. New York: Wiley,* 1939. 220 pp. Price, $2.75.

There are two ways of advancing the knowledge of a subject: (1) by gathering additional data about it, and (2) through a better understanding of the facts which are at hand.

The book under review is intended to help in the second way. It is written for whoever wants to use numerical data, without regard to what these data represent. It may be of help to health workers who feel they would like to have an advanced knowledge

of statistical methods, but it is hardly the book for those who want more information concerning the steps commonly employed. It says nothing of the need of a clear understanding of the limitations which should be placed upon numerical data, of the need of scrupulous accuracy in the collection of the facts which are to be used statistically, of the danger of drawing misleading inferences from a too limited supply and of the risk of attaching too much importance to statistical statements simply because they are statistical. Such matters are not within the scope of this volume. They belong to the kindergarten training of those who aspire to use such methods as are described here.

For those who have some knowledge of statistical methods already and want to improve and extend it in accordance with the best present-day practice, this book will be found to be a useful and authoritative guide.

GEORGE A. SOPER

Health Officers' Manual—*By J. G. Geiger. Philadelphia: Saunders,* 1939. 148 pp. Price, $1.50.

Helpful quiz compends have often grown out of the necessities of administrative organizations. The manual from Dr. Geiger's hand seems to be no exception. For new employees entering a city health department without any vocational experience or training or familiarity with functions or duties to be performed, his little book will show him his way about.

As would be expected from its authorship and the city of origin the form of organization presented reflects the characteristics of the dual rôle of the San Francisco Department of Health under which hospital and other medical services for the sick are included as they are in Philadelphia and a few other cities in the United States. This does not illustrate approved health department practice. Nor is it usually accepted that the issuance of food supplies to undernourished children should be a regular function of the health department.

Among the excellent and convenient features of this manual are the educational charts illustrating the natural history of communicable diseases. Also, one notes with satisfaction that births are expected to be reported within twenty-four hours, a much desired improvement over current city health practice in the United States.

This is not a book of general value for physicians or for graduates in public health, but is a convenient summary of the services of one of our best health-administered cities which lay groups of teachers and social or welfare workers on the west coast will find useful.

HAVEN EMERSON

The Clinical and Experimental Use of Sulfanilamide, Sulfapyridine, and Allied Compounds—*By Perrin H. Long, M.D., and Eleanor A. Bliss, Sc.D. New York: Macmillan,* 1939. 319 pp. Price, $3.50.

The prominence which sulfanilamide and its allied compounds has rather suddenly attained during the past six years and the promise of their value in therapeutics in the future renders the intelligent clinical use of these compounds a matter of prime importance. The authors, as prominent workers in this field, have reviewed the investigations in this newest development in chemotherapeutics, and have outlined their own experiences. In eight chapters, they have covered the historical aspects of the subject; the chemotherapy of experimental bacterial infections; the experimental toxicity and comparative pharmacology of the several derivatives; the mode of action of the drugs; their clinical use; and finally the clinical toxic manifestations.

The historical development of the

subject is well handled and forms an interesting chapter, which should serve as a basis for an important addition to the general history of medicine. The chapters dealing with the experimental use of the drugs, dealing with many controversial subjects, are unavoidably concerned with many differences of opinion. The sections on the clinical use of the several derivatives cover most of the indications, and should be of material benefit to those not cognizant of the more outstanding papers in this field, although adding little to what has already been written. In these chapters, a well-timed definition of the several derivatives is given to clarify the confusion created by the multiplicity of trademark names attached to the various compounds. Wisely, too, is included a rather complete description of the use of the drugs in gonococcal infections with adequate discussion of the altered difficulties in the evaluation of criteria of cure of gonorrhea in the adult, with implications of the sociological importance.

The dangers involved in the use of these drugs are outlined in the section on clinical toxicity, which states very clearly the author's opinions of the significance of the various toxic manifestations, which will clarify this important phase of the subject to those unacquainted with it. Knowledge of the significance of the toxic manifestations is important not only in preventing the serious reactions which sometimes occur, but also in being able to proceed with what may be very important therapy in face of some of the drug symptoms, which are now known not to be contraindications. The importance of using these very potent, but potentially dangerous, compounds only under strict medical supervision is intimated in the chapter on clinical toxicity.

Throughout, the authors have upheld rather strictly their own interpretations of both the experimental and clinical use of the compounds, even on those subjects which, at the time of writing, were quite controversial, and their criticisms of opposing viewpoints seem, at times, unwarrantedly and needlessly violent. As must be expected in a monograph written so early on a new and rapidly developing subject, much is unsettled, and conclusions cannot be too definite. Likewise, even in the short space of time elapsing between the writing and the publication of the book, many important contributions have been made, particularly in regard to sulfapyridine, but at this time the book appears to add a definite contribution to the general intelligent use of these important compounds. An extensive bibliography is included and the book is well indexed with both authors and subjects.

HENRY L. BARNETT

You're the Doctor—*By Victor Heiser, M.D. New York: Norton,* 1939. 300 pp. Price, $2.50.

This is a book on personal hygiene based on the experiences of the author. The dominant note is that health depends more largely on correct eating than on any other single factor. Indeed, the author calls it the pivot about which everything else revolves. He explains that his own personal health is so good for a man of his age that he constantly has to explain what he has done to bring it about. This is a very weak argument as has been proved many thousand times. All of us can remember Fletcher and his fads, yet the world did not adopt his ideas about much chewing.

Each chapter has a name which takes the fancy and excites curiosity. "Where'er I Roam" is a survey of the different foods which the author has eaten in practically every part of the world. Perhaps the best chapter is the last, "A Merry Heart Doeth Good Like

a Medicine." There are many anecdotes collected from practically every part of the world. The advice given is generally sound. The book is interestingly written and will probably appeal to the public. It is being pushed on the reputation of the author's first book, *An American Doctor's Odyssey,* and the jacket gives some of the ordinary blurb which unfortunately disfigures so many books.

Some of the statements lack exactness. For example, the story of Pasteur's discovery regarding chicken cholera on page 55. Anyone reading this is entitled to believe that the author is speaking of the vibrio of Asiatic cholera and not the entirely different germ of chicken cholera. The lay public for whom he is writing will not recognize the difference and is entitled to a correct statement. The book is well printed and put together.

MAZÝCK P. RAVENEL

Community Health Organization —*Ira V. Hiscock, Editor (3rd ed.). New York: Commonwealth Fund,* 1939. 318 pp. Price, $2.50.

Hiscock has again given us a thoroughly revised and up to the minute edition of this valuable book. It is a work which all who toil in the field of public health have learned to welcome because it so gently and effectively broadens the vision, points out the challenges and opportunities of the coming decade, and establishes an active discontent with any *status quo* or *laissez faireism.*

This volume follows in general outline the editions of 1927 and 1932 and has its basis in the continuing work of the Committee on Administrative Practice of the American Public Health Association. It leaves the distinct impression that a community health organization which might be considered fairly good as of today or yesterday cannot rest on any laurels, for there is much to be done, new work to be undertaken, with the goal well ahead, out of any immediate reach, if not perhaps even out of sight.

The reader sees clearly that quality of public health service is as important as quantity, in all the accepted usual range of community health work, such as venereal disease, tuberculosis, and general communicable disease control; school hygiene, the laboratory, and public health nursing. He lays down the book knowing full well that there must be a bold official approach to a more adequate provision for medical care. The editor makes it plain that in this and all health fields success will be most striking where there is a better knit and more active teamwork among many community agencies that heretofore have merely been on speaking terms with each other.

Recreation, housing, hospital planning, real industrial hygiene, all find their place in this helpful and stimulating new edition. Numerous type-specimen communities are there to beckon us on. No doubt there will be health officer readers who will water at the mouth over the suggestion of a month's vacation for health department staff members, and at some of the upper salary ranges as given at the chapter ends—perhaps enough to go out and work hard for some of these obvious desiderata.

HUNTINGTON WILLIAMS

Social Psychology of Adolescence —*By E. DeAlton Partridge. New York: Prentice-Hall,* 1938. 361 pp. Price, $2.75.

The author introduces his subject with the premise that, "since every agency dealing with young people approaches them in some kind of social setting, the significance of this social setting must be recognized if we are to understand the behavior of young people." He concludes that, "if one

accepts the point of view of social psychology, then the use of groups in treating behavior difficulties is of utmost importance. Since behavior arises out of the relationships surrounding the individual, the changing of behavior depends on a change in these relationships."

Between his premise and his conclusion the author surveys what he considers the more significant phases of sociology and psychology as they relate to young people in modern society. To be most fruitful, he says, the study of the adolescent must be the study of human beings growing up; the consideration of the process by which each individual becomes a social being.

Social psychology is by no means a new avenue of approach to the problems of youth. This book differs from many of its predecessors in the dynamic qualities of the organismic, or Gestalt, point of view from which it is written and in its practical suggestions for utilizing present, everyday social contacts and aspirations as means of working out the solutions to the problems of the normal adolescent as well as those of the "problem child" and the delinquent.

The book is addressed "to those who are working with young people." To those who have done considerable reading or have had wide experience in this field much of the material may appear elementary in nature. To all, however, the book will bring a freshness and vitality which make the reading of it a pleasure, and a positive, constructive approach which should be an inspiration to even the most experienced worker. FREDERICK W. BROWN

Your City—*By E. L. Thorndike. New York: Harcourt, Brace,* 1939. 204 pp. Price, $2.00.

This book attempts to give a rating to the larger cities (some 310 of them) in the United States, on the basis of what is called "goodness," and suggests that any city may be appraised by applying the same standards described.

Appraisal is not a new thing and has been applied quite extensively in the last few years to public health activities and facilities. When one is measuring the extent of services or the facilities available, the appraisal may not be overdifficult, but when an attempt is made to evaluate the quality rather than, or in addition to, the quantity, one is confronted with some real difficulties. In attempting to appraise not simply one feature of a city, but all features of any importance, the task becomes stupendous. Who is to determine just what is to be included and what excluded, and what relative weight is to be given to each item in determining the total score or comparative ranking? Thorndike has attempted an appraisal of "goodness" on the basis of 37 items.

While there are a number of characteristics that we would expect to find in any "good" city just as in any good person, it is quite questionable whether the number of automobiles or radios in use, or the number of beauty parlors, or many other items, can be taken as criteria by which to measure a city as to its wealth, progress, or desirability as a place in which to live. The author recognizes this.

The study may be interesting for those who wish to apply not all the 37 criteria, but the "Ten-Item City Yard Stick" (page 153) to their own city.

The book contains a great deal of valuable advice to those who would improve their city, and this advice rather than the more intricate variable and coefficients will be most likely to impress city administrators.

JAMES WALLACE

Social Welfare Laws of the Forty-Eight States—*By Wendell Huston,*

Compiler. Seattle: Wendell Huston Co., 1937. Loose leaf binding, 1,397 pp. Price, $12.50.

This third edition, loose-leaf volume, brings up to date of time of publication the main social legislation, containing a vast amount of material well organized into a comprehensive volume. To public relief laws have been added labor laws. Following details of the Federal Social Security Act (with skeleton index), are given the laws of each state preceded by a useful index. While legislation relating to public health in the states is incomplete, the relative completeness of other phases of social legislation and the plan of arrangement make this volume a useful reference, especially for the administrator.

IRA V. HISCOCK

Un pays qui s'abandonne devant un danger qui grandit: l'alcool—*By Dr. Jacques Parisot and Dr. Gabriel Richard. Nancy-Paris-Strasbourg: Berger-Levrault,* 1939. 39 pp.

This is a study of the effects of alcohol from the social aspect, and concerns France primarily. The World War led to measures which greatly diminished the amount of alcohol consumed as a beverage. In less than 3 years after the Armistice the restrictive laws began to be attacked with the result that a greatly increased consumption of alcohol is now in evidence. The authors bemoan the fact that France leads in the annual per capita consumption—160 liters against 97 for Italy, 88 for Spain, 44 for Switzerland, and much less for other countries.

The factors chiefly responsible are: (1) excessive number of dramshops, (2) too much leisure, due to the 40 hour work-week, (3) privileges granted to distillers of brandy for private use, (4) use of particularly toxic drinks similar to, and the substitutes for, absinthe.

As remedial measures the authors support the program of The Academy of Medicine which has been sent to successive administrations for 30 years: (1) modification or abolition of the privileges granted to private brandy distillers, (2) limitation of the number of dramshops, (3) increasing the tax on alcoholic drinks and suppression of those made with aniseed, or a reduction of their toxicity, (4) establishment of recreation centers in which only non-alcoholic beverages, fruit juices, and fruits in every form are served.

Ways and means are discussed. Some of the problems are common to all countries, some peculiar to France.

The arguments are well presented from a scientific standpoint, and the language is clear.

MAZŸCK P. RAVENEL

An Industrial Department of Health—*By Northwestern University Medical School, Department of Industrial Medicine. Bull No. 9. Chicago: Northwestern University,* 1939. 56 pp. Price, $2.00.

This *Bulletin* attempts to put into brief manual form the opinions of many authors as to what constitutes adequate medical service in industry. It is carefully prepared, purposely brief but comprehensive.

Some 38.78 per cent of the entire population of the United States depends for a livelihood on a job in some industrial establishment (1930 Census). While sickness does not usually have a direct relation to occupation, it has tremendous economic results in decreased efficiency of workmen as well as otherwise. Management and labor are agreed that the maintenance of good health is of first importance. The medical and hygienic aspects are supreme but require the services of those in several specialities. Some 80 to 90 per cent of industrial groups are served by doctors in ordinary private

practice and the situation demands. more or less special training so that recent graduates in medicine must serve a further apprenticeship of some kind. As a general rule physicians serving industry on a part-time basis is best. Outside of especially hazardous industries where the necessity of frequent examinations and check-ups is obvious, it is desirable that all employees be given a physical examination at least once every 3 years. A routine Wassermann is recognized as a valuable public health procedure but is not a prerequisite for employment. The bases for employment rejection are carefully outlined.

There is an occupational health hazard of some degree in almost every manufacturing process and the medical department must designate all conditions which adversely affect the health of workers. Most occupational health hazards are well known and easily recognized, also solvable by ordinary intelligence. General hazards are usually of major importance although specific hazards may be no less important for certain individual employees. Close coöperation with the state department of health is essential. Treatment is ordinarily a function of the individual or the community. Among all types of sickness disability, none requires more experience and knowledge than the differential diagnosis of an occupational disease, and it is imperative that medical service shall be competent in this field.

The significance of socialized medicine and insurance schemes which are rapidly extending over the country is given close comment. Attention is called to official governmental reports suggesting that some 40,000,000, or nearly one-third of the population, are receiving inadequate medical service.

Shop committees upon which labor is represented are necessary. The closeness of workmen to given local problems and their intimate knowledge of men, machines, and danger points make for a high degree of effectiveness.

The reviewer finds few advocacies and statements which he would not endorse as outlined.

EMERY R. HAYHURST

When Social Work Was Young—*By Edward T. Devine. New York: Macmillan,* 1939. 163 pp. Price, $1.75.

This book records personal recollections of activities and conditions associated with the development of social work during the past 40 years, but especially between 1890 and 1910, including brief descriptions of the contribution of leaders in the movement. A chapter on prevention of tuberculosis, describing the significant rôle played by the Charity Organization Society in the advancement of educational and preventive measures and in the establishment of organizations will be of particular interest to public health workers.

IRA V. HISCOCK

Guiding Principles for Studies on the Nutrition of Populations—*By Dr. E. J. Bigwood. New York: Columbia University Press,* 1939. 281 pp. Price, $1.50.

The League of Nations Technical Commission on Nutrition has again sponsored a useful and enlightening publication. A complete and well outlined presentation of the points that should be stressed in conducting nutrition surveys of populations is given in this monograph. Nutritionists and dietary specialists will find this booklet of value in surveys of any size since the methods are applicable not only to groups of a few persons but to whole nations as well. A complete nutrition survey of any group of persons calls for an investigation of their food consumption. This purpose is adequately served in Part I in which are discussed

the types, methods and scope of surveys; the investigating staff; classification of foodstuffs; physiological value of the diet; economics; and statistical considerations.

Part II deals with how the state of nutrition should be studied in relation to diet. This section includes discussion of somatometric, clinical, and physiological tests and gives examples of the various types of surveys in a number of countries.

The author presupposes no advanced knowledge on the part of the reader and discusses nutritive principles, tests, and statistics with such clarity that both the student and the experienced worker will benefit.

An appendix contains numerous examples of record forms and tables used in the leading countries where dietary surveys have been made. The bibliography is efficiently up-to-date.

ARTHUR S. LEVINE

BOOKS RECEIVED

LABORATORY MANUAL FOR GENERAL BACTERIOLOGY. Compiled by George L. Peltier, Carl E. Georgi and Lawrence F. Lindgren. 2d ed. New York: Wiley, 1939. 277 pp. Price, $2.00.

EPIDEMIOLOGY IN COUNTRY PRACTICE. By William Norman Pickles. Baltimore: Williams & Wilkins, 1939. 110 pp. Price, $2.50.

MATERNAL CARE AND SOME COMPLICATIONS. By F. L. Adair, Editor. Chicago: University of Chicago Press, 1939. 194 pp. Price, $1.50.

TEACHING WHOLESOME LIVING IN THE ELEMENTARY SCHOOL. By Alma A. Dobbs. New York: Barnes, 1939. 304 pp. Price, $2.50.

ATTAINING WOMANHOOD: A DOCTOR TALKS TO GIRLS ABOUT SEX. By George W. Corner. New York: Harper, 1939. 95 pp. Price, $1.00.

A HANDBOOK OF ELEMENTARY PSYCHOBIOLOGY AND PSYCHIATRY. By Edward G. Billings. New York: Macmillan, 1939. 271 pp. Price, $2.00.

BUTTER. By C. C. Totman, G. L. McKay and C. Larsen. 4th ed. New York: Wiley, 1939. 472 pp. Price, $3.50.

BULLETIN OF THE HEALTH ORGANIZATION. Vol. VIII, Nos. 1–2. This Bulletin starts with the Annual Report of the Health Organization of the League of Nations. New York: Columbia University Press, 1939. 386 pp. Price, $1.30.

202 COMMON HOUSEHOLD PESTS OF NORTH AMERICA. By Hugo Hartnack. Chicago: Hartnack Publishing Co., 1939. 319 pp. Price, $3.75.

ELEMENTS OF SANITATION. By Edw. S. Hopkins, Editor. New York: Van Nostrand, 1939. 435 pp. Price, $4.00.

FOOD CONTROL: ITS PUBLIC-HEALTH ASPECTS. By James Houston Shrader. New York: Wiley, 1939. 513 pp. Price, $4.00.

THE HEALTH INSURANCE DOCTOR. HIS RÔLE IN ENGLAND, DENMARK AND FRANCE. By Barbara N. Armstrong. Princeton: Princeton University Press, 1939. 264 pp. Price, $3.00.

HOW TO KEEP WELL. By Irving S. Cutter. Chicago: Chicago Tribune Public Service Office, 1939. 76 pp. Price, $.28.

VENEREAL DISEASES: DIAGNOSIS, TREATMENT AND LABORATORY METHODS. Published and distributed by the Department of Pensions and National Health, Toronto, Canada, 1939. 93 pp.

THE CHILD IN THE HOME. By Leila Wall Hunt. New York: Prentice-Hall, 1939. 259 pp. Price, $2.50.

A TEXT-BOOK OF OCCUPATIONAL DISEASES OF THE SKIN. By Louis Schwartz and Louis Tulipan. Philadelphia: Lea & Febiger, 1939. 799 pp. Price, $10.00.

THE PSYCHOLOGICAL ASPECTS OF PEDIATRIC PRACTICE. By Benjamin Spock and Mabel Huschka. New York: Reprint by New York State Committee on Mental Hygiene of the State Charities Aid Association by courtesy of the Appleton-Century Co., 1939. 154 pp. Price, $.25.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Finding Venereal Infections—Eminently sound and practical is this 15 year old V. D. case finding program which is recounted in matter-of-fact detail without fanfare. In at least one state, then, this essential work has gone on unobtrustively, year after year, even though some recently inaugurated epidemiologic projects have been reported with all the innocent enthusiasm of a Columbus bumping into a new world.

CASSELMAN, A. J., and CADWALLADER, A. Venereal Disease Contact-Tracing in Camden, New Jersey. Ven. Dis. Inform. 20, 7:185 (July), 1939.

British Attitudes on Social Medicine—To the question, "would a general medical service benefit the nation?" most (British) general practitioners would say "yes," says this ex-secretary of the B. M. A. who also says "yes." At the present time a complete medical service is quite out of reach of the great majority, and charity is not the solution of the problem. "Yes" says a medical officer of health. "Yes" said the discussants.

COX, A., and SCOTT, J. A. Would a General Medical Service Benefit the Nation? J. Roy. Inst. 2, 9:537 (Sept.), 1939.

For the Prevention of Shoulder Chips—Gold is sometimes found in unusual places. Here in an unlikely spot the health worker, whatever his job may be, will find some pure gold. True, the discussions are concerned with the water works and John Q. Public, but substitute whatever project may be your particular niche and you'll find the words of wisdom equally applicable.

CRIST, M. L. Public Relations. J. Am. Water Works Assn. 31, 8:1308 (Aug.), 1939.

Selling Health in a Skeptical Market—It is foolish to assume that healthy people generally are interested in abstract health. To be effective our efforts to influence health behavior must be individualized in terms of specific personal or group needs and aspirations. To recognize the limitations of our educational procedures may cause a better selection of methods, wisely concludes this author who must have come from Missouri.

DERRYBERRY, M. How to Influence Health Behavior of Adults. Health Officer 4, 3–4:114 (July–Aug.), 1939.

Primary Tuberculosis Is Protective—Evidence is presented to show that tuberculin reactors are less likely to develop tuberculosis when later exposed to infection than are those who are tuberculin negative.

FLAHIFF, E. W. The Occurrence of Tuberculosis in Persons Who Failed to React to Tuberculin, and in Persons with Positive Tuberculin Reactions. Am. J. Hyg. 30, 2:69 (Sept.), 1939.

Cement Dust's Bark Worse Than Bite—Compared to other dusty industries the hazard in cement manufacture is trivial. The incidences of tuberculosis and other chronic infections of the lungs were found to be less than those in the general population. Evidently prolonged inhalation of cement dust has no unfavorable influence upon tuberculosis.

GARDNER, L. U., *et al.* Survey in Seventeen Cement Plants of Atmospheric Dusts and their Effects Upon the Lungs of Twenty-two Hundred Employees. J. Indust. Hyg. & Toxicol. 21, 7:279 (Sept.), 1939.

Where Syphilis Will Soon Be Running Out of Disguises—Can you imagine any public health periodical being genuinely entertaining as well as informative? This review of recent statements should give rise to several broad grins—which is some kind of a record.

HARPER, C. A. Wisconsin's Health. State Board of Health Bull. 6, 15:3 (July–Sept.), 1939.

Eating Habits in the Orient—Observing the course of nutritional deficiency diseases around the world, this author has a wide background of unique and dramatic experiences with which to illustrate the universal damage done by defective diets.

HEISER, V. G. The Influence of Nutrition on the Diseases of Middle and Old Age. Sci. Month. 49, 4:304 (Oct.), 1939.

Curing TB. Individually and Socially—Collapse therapy for the tuberculous is not only an invaluable therapeutic measure, but it has a wide public health significance as well. Just as it offers the patient his best chance, so it offers the community its best protection. Hence health officials have an immediate interest in the wide extension of this measure.

HRUBY, A. J. Collapse Therpy of Tuberculosis. Am. Rev. Tuberc. 40, 3:255 (Sept.), 1939.

Effective Water Purification—From this excellent symposium on safety of public water supplies, one gathers that the number of outbreaks of water-borne disease are not due to inherent weaknesses in purification methods but in the failure to utilize standard procedures. A number of extremely practical questions are raised, and assured by a succession of authorities in this field.

NORCOM, G. D., *et al.* Symposium on Water Quality. J. Am. Water Works Assn. 31, 9:1475 (Sept.), 1939.

Who Was Sick and Why—How the National Health Survey was carried out and who did it, is explained in this paper which introduces a series of special reports, to be issued in the near future, on illness and medical care in relation to age, economic status, and employment; frequency of accidents in the home, in employment and on the highway; and adequacy of maternity services, status of housing, etc.

PERROTT, G. ST. J., *et al.* The National Health Survey. 54, 37:1663 (Sept. 15), 1939.

Our Great Microbiologist—An appreciation of a distinguished American medical scientist by a French colleague, equally distinguished, constitutes a valued supplement to all that has been written about the man we all have long revered.

RAMON, G. WILLIAM HALLOCK PARK. J. Immunol. 37, 3:179 (Sept.), 1939.

Minimum, Adequate, Optimal Standards—We are reminded by this paper of the vulnerability of easy assumptions. Here in an institution where boys on an "adequate" diet, including the sacred quart of milk, together with fair amounts of basis foods, and these boys were found to be mostly within "normal" weight ranges. But when bananas were given as supplementary feeding to half the boys they made consistently better growth and development by every measure of physical status. Most significant differences were in blood ascorbic acid.

ROBERTS, L. J., *et al.* The Supplementary Value of the Banana in Institution Diets. J. Pediat. 15, 1:25 (July), 1939.

Measuring Diphtheria Prophylaxis Values—What is the best statistical method of checking efficiency of active immunization against diphtheria? What are the severity and clinical typology of diphtheria which occur in immunized children? For answers read this Chicago study which comments on un-

critical, but common, statistical assumptions.

SECKEL, H. P. G. Prevention of Diphtheria. Am. J. Dis. Child. 58, 3:512 (Sept.), 1939.

Teamwork—If the health officer will tell the teacher exactly what he would like to have his public believe and support, the school teacher ought to be able to work out the educative processes that will start school children on the road to believing and doing. How the two may work together is the subject of a provocative discussion.

SHEPARD, W. P. Sharpening the Focus in Health Education. J. Health & Phys. Ed. 10, 7:378 (Sept.), 1939.

Health Services for Tomorrow—Health articles are sometimes found far from their usual home in the scientific press these days. In this consumer's publication you may read a paper forcefully presenting the most telling arguments for a complete national health service. Let's forget the humanitarian reasons, urges the author, and turn our minds to the Nation's sickness bill of 10 billions. The capital value of preventable deaths, he says, is 6 billions.

SIGERIST, H. E. The People's Health. Consumers' Union Reports 4, 9:17 (Sept.), 1939.

Cancer Statistics — Reviewing British cancer statistics the author finds that the increasing crude death rates disappear (in women) when allowance is made for increasing age of the population. But the increase in males which defies age group correction, when considered by sites of the disease, suggests that the incidence of cancer of some organs may actually be increasing. Here are some promising lines of approach.

SMALLMAN, A. B. The Cancer Problem. J. Roy. Inst. 2, 9:555 (Sept.), 1939.

Diver's Diseases — Apparently nature intended man to keep out of the water, else she would have provided him with selfclosing nostrils and ears, and fixed him up with a better temperature-control apparatus. This being the case, you had better respect the limitations of your physical equipment. What you can do to protect yourself is considered briefly.

TAYLOR, H. M. Otitis and Sinusitis in the Swimmer. J.A.M.A. 113, 10:891 (Sept. 2), 1939.

Wholesale Tuberculosis Examinations—British experience in mass X-raying by means of minicam photographs of the image on a fluorescent screen indicates that the method is both practical and inexpensive. A hundred and more cases per hour at an expense of about one cent each is reported.

THOMAS, A. R. Mass Radiography. Pub. Health 52, 12:1939 (Sept.), 1939.

Cutting the Toll of Congenital Syphilis—If, as the author says, "Every syphilitic baby is a failure of maternal education," and each year 60,000 syphilitic babies are born in addition to 25,000 stillbirths, then maternal education appears to be enjoying plenty of failures. As there are at least a million potential mothers infected with syphilis it would seem that health officers and educators have a job ready-made for them.

VONDERLEHR, R. A. Maternal Education, the Root of the Congenital Syphilis Problem. Health Officer 4, 3–4:118 (July–Aug.), 1939.

ASSOCIATION NEWS

OFFICERS, 1939–1940

President, EDWARD S. GODFREY, JR., M.D., Albany, N. Y.
President-elect, W. S. LEATHERS, M.D., Nashville, Tenn.
First Vice-President, ELISABETH L. SMELLIE, R.N., Ottawa, Ont., Canada
Second Vice-President, DOMINGO F. RAMOS, M.D., D.Sc., Havana, Cuba
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Treasurer, LOUIS I. DUBLIN, PH.D., New York, N. Y.
Executive Secretary, REGINALD M. ATWATER, M.D., DR.P.H., New York, N. Y.
Chairman of Executive Board, ABEL WOLMAN, DR.ENG., Baltimore, Md.

The Annual Meeting in 1940 will be held in Detroit, Mich.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Wendell C. Anderson, M.D., M.S.P.H., Bolte Bldg., Huntingburg, Ind., Director, District 2, State Board of Health

Millard B. Bethel, M.D., 160 S. Union St., Concord, N. C., Cabarrus County Health Officer

James C. Brabham, M.D., Box 13, Lexington, S. C., Lexington County Health Officer

Howard W. Hassell, M.D., 318 DeKalb St., Bridgeport, Pa., District Medical Health Officer, State Dept. of Health

Arthur W. Hopper, M.D., 356 Locust St., Washington, Pa., Washington and Green County Health Officer

Frank A. Moore, M.D., 701 College St., Trenton, Tenn., Gibson County Health Officer

Clifford C. Shoro, 61 Russell Road, Stop 5 Western Ave., Albany, N. Y., Administrative Finance Officer, State Dept. of Health

Eugene L. Speranza, 634 Fillmore Place, West New York, N. J., Assistant Health Director, City Health Dept.

A. H. Stewart, M.D., State Dept. of Health, Harrisburg, Pa., Deputy Secretary of Health

Laboratory Section

Salvador G. Aguilar, M.D., la C.P. Su Salvador, El Salvador, C.A., Head of Laboratories, Public Health Service

Charles P. Carpenter, Ph.D., 216 Laboratory of Public Health and Preventive Medicine, 34th and Locust Sts., Philadelphia, Pa., Assistant Professor of Public Health and Preventive Medicine, Univ. of Pennsylvania Medical School

Robert P. Gaines, Ph.G., M.A., 641 Broadway, Bayonne, N. J., Public Analyst

George F. Hadley, Ph.B., 1021 Ridge Ave., N.S., Pittsburgh, Pa., Analyst, City Health Dept.

Charles W. Rees, Ph.D., 8613 Cedar St., Silver Spring, Md., Senior Protozoölogist, National Institute of Health

Jorge E. Zepeda, M.S., Calle "La Fuente," Tegucigalpa, D. C., Honduras, C. A., Laboratory Worker, Direccion Gral. de Sanidad

Vital Statistics Section

Ralph C. Fletcher, M.A., 519 Smithfield St., Pittsburgh, Pa., Director, Bureau of Social Research, Federation of Social Agencies of Pittsburgh and Allegany County

Marta Fraenkel M.D., 465 West 23rd St., New York, N. Y., Research Worker, Welfare Council of New York City

Jane Ward, A.B., 625 Goode St., Montgomery, Ala., Statistician, State Board of Health

Public Health Engineering Section

Paul E. Bishop, B.S., 6311 S. E. Clinton St., Portland, Ore., Sanitarian, City Health Bureau

Kenneth C. Chew, A.B., Route 1, Las Cruces, N. M., Sanitarian, District 4 Health Dept.

Gilbert H. Dunstan, M.S., Box 1996, University, Ala., Assistant Professor of Mechanics, Univ. of Alabama

George Feldman, B.A., 37 Fayette St., New Haven, Conn., General Inspector, City Health Dept.

Herbert H. Hasson, B.S., 58 Bowen St., Battle Creek, Mich., Project Engineer, W. K. Kellogg Foundation

Harold S. Hopler, B.S., Cheriton Point, Montoursville, R. D., Pa., Sanitarian, State Dept. of Health

Industrial Hygiene Section

Franklin J. Halpin, M.D., Surgeon, U.S.P.H.S., 2400 16th St., N.W., Washington, D. C., Medical Director, U. S. Compensation Commission

John Safford Wiley, M.S.E., State Board of Health, Indianapolis, Ind., Assistant Engineer, Bureau of Industrial Hygiene

Food and Nutrition Section

Lawrence L. Little, M.S., 3320 N.W. 13th St., Oklahoma City, Okla., Laboratory Technologist, Sterling Milk Products Co.

Ethel Austin Martin, National Dairy Council, 111 N. Canal St., Chicago, Ill., Director of Nutrition Service

Child Hygiene Section

Charles E. Presnell, D.D.S., M.S.P.H., State Health Dept., Jefferson City, Mo., Assistant State Dentist

Earl H. Ridgeway, O.D., 140 W. State St., Trenton, N. J., Optometric Consultant, State Colony, New Lisbon, N. J.

Public Health Education Section

Elizabeth H. Bohnenberger, State Board of Health, Jacksonville, Fla., Director, Bureau of Health Education

Margaret C. Donaldson, A.B., 581 Chestnut St., Meadville, Pa., Executive Secretary, Crawford County Tuberculosis Society

John E. Farrell, A.B., 106 Francis St., Providence, R. I., Executive Secretary, Providence Medical Assn.

Ira E. Foutz, 311 S. Juniper St., Room 507, Philadelphia, Pa., Assistant Executive and Publicity Secretary, Pennsylvania Tuberculosis Society

Jean Henderson, P. O. Box 210, Jacksonville, Fla., Public Relations Consultant, State Board of Health

Milton Rose, M.D., Laboratory of Hygiene, University of Pennsylvania, Philadelphia, Pa., Visiting Lecturer in Public Health, Univ. of Penna. Medical School

Harold W. Slocum, A.B., 348 College St., Burlington, Vt., Executive Secretary, Vermont Tuberculosis Assn.

Public Health Nursing Section

Gertrude Aufranc, R.N., M.A., County Court House, Mexico, Mo., Orthopedic Field Nurse, State Service for Crippled Children

Milada C. A. Botten, 1100 Donaldson Bldg., Minneapolis, Minn., Executive Secretary and Registrar, Minneapolis Nurses Assn.

Winifred Devlin, B.S., R.N., Michigan Dept. of Health, State Bldg., Lansing, Mich., Regional Supervisor

Frances A. Harris, R.N., 367 N. 21st Ave., Phoenix, Ariz., Public Health Nurse, State Board of Health

Lois L. Owen, Dept. of Public Instruction, Harrisburg, Pa., School Nursing Adviser

Rosemary Phillips, R.N., B.S., 7521 Byron Place, Clayton, Mo., Director of Nurses, St. Louis County Health Dept.

Epidemiology Section

Vlado A. Getting, M.D., M.P.H., 11 Perkins Square, Jamaica Plain, Mass., Technical Director, Mosquito Survey, State Dept. of Public Health

George H. Hodel, M.D., 1853 Park Drive, Los Angeles, Calif., Social Hygiene Physician, Los Angeles County Health Dept.

James H. Lade, M.D., State Office Bldg., Albany, N. Y., Medical Consultant in Syphilis Control, State Dept. of Health

Elroy F. McIntyre, M.D., C.P.H., State Capitol Bldg., Santa Fe, N. M., State Venereal Disease Control Officer, State Dept. of Health

Edwin Peterson, M.D., Bureau of Medicine and Surgery, Navy Dept., Washington,

D. C., Assistant, Dept. of Preventive Medicine

Nephi H. Savage, M.D., The Eaton, Apt. 204, Cheyenne, Wyo., Director, Division of Epidemiology, State Dept. of Public Health

Leonid S. Snegireff, M.D., M.P.H., 49 Maple Ave., Trenton, N. J., Medical Supervisor, Preventable Disease Control, State Dept. of Health

Unaffiliated

George A. Bunch, D.D.S., 925 Main St., Columbia, S. C., Director, Division of Oral Hygiene, State Board of Health

Charles Dubois, M.S., City Hall, Albuquerque, N. M., City Sanitary Inspector

Eleanor L. Hearon, M.A., 4200 E. 9th Ave., Denver, Colo., Director, Medical Social Service, Colorado General Hospital

DECEASED MEMBERS

A. H. Flickwir, M.D., Fort Worth, Tex., Elected Member 1921, Elected Fellow 1923.

McLeod Gillies, M.D., Charleston, W. Va., Elected Member 1935.

Charles C. Hopkins, C.E., Rochester, N. Y., Elected Member 1926.

Edward Vincent Murphy, M.D., Newport, R. I., Elected Member 1926.

Joseph C. Palmer, M.D., Syracuse, N. Y., Elected Member 1936.

Walter S. Stevens, M.D., Oklahoma City, Okla., Elected Member 1937.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, identifying clearly the key number on the envelope, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y.

Positions Available

The Civil Service Commission makes announcement of examinations for the following positions:

Senior Medical Officer, $4,600 a year
Medical Officer, $3,800 a year
Associate Medical Officer, $3,200 a year

Some of these examinations are for openings in the U. S. Public Health Service in the fields of venereal disease control and industrial hygiene.

Closing dates for receipt of application are as follows:

(a) November 13, 1939, if received from states other than those named in (b) below

(b) November 16, 1939, if received from the following states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

(c) March 11, 1940, if received from points in Alaska south of the Arctic Circle.

Necessary application forms may be obtained from the Secretary, Board of U. S. Civil Service Examiners, at any first class post office, or from the U. S. Civil Service Commission, Washington, D. C.

Positions Wanted

Physician, M.D., Vanderbilt University; Dr.P.H., Johns Hopkins; experienced as epidemiologist, health officer and professor of preventive medicine, seeks position as administrator or epidemiologist. **A397**

Physician, M.D., Johns Hopkins; M.S.P.H., University of Michigan; experienced in school and city health work; for the past year director of county health department, seeks position as health director of city school system or in health service of a college or university. Will also consider position as epidemiologist or health officer in urban health department. **A354**

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics and venereal disease field survey officer. **A305**

Physician, 32, married, M.D. 1936; postgraduate course in v.d. control, experienced as district health officer and in organizing and publicizing syphilis control campaign; now employed in charge venereal disease clinics in metropolitan health department; seeks v.d. control post with emphasis on organizational, investigative-survey or administration. **M437**

Young man, bacteriologist, M.S., Cornell; Ph.D., Rutgers; experienced in bacteriology, water supply, sewage, dairy and general public health laboratory work, extensive research in bacteriology and sanitary chemistry, high federal and state civil service ranking as bacteriologist, now employed as bacteriologist in eastern hospital; seeks responsible position in laboratory work or teaching of bacteriology, dairy industry or sanitary chemistry. **L439**

Experienced teacher in biochemistry and bacteriology; Ph.D., Iowa; now laboratory director in midwestern state; will consider teaching, executive or administrative position. **L440**

Physician, M.D., Loyola; 4 years' practice of industrial hygiene and surgery; former deputy state health officer; experienced in hospital administration, seeks position. **M441**

Positions Open

LABORATORY TECHNICIAN—County bacteriological laboratory; should be primarily trained as biochemist but familiar with routine clinical laboratory examinations; $1,500-$1,800, increasing; East. 110-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH PHYSICIAN—Young man or woman physician, excellently trained internal medicine, for student health staff, exclusive junior college for women; appointment for one year, subject to renewal. 111-PH, Medical Bureau, Palmolive Building, Chicago.

COUNTY HEALTH OFFICER—Southern rural district; native southerner, or physician thoroughly familiar with the problems of the South preferred. 112-PH, Medical Bureau, Palmolive Building, Chicago.

RESIDENT SCHOOL PHYSICIAN — Recent graduate eligible; unmarried physician, American-born and trained required; school for boys; $100, maintenance. 113-PH, Medical Bureau, Palmolive Building, Chicago.

CLINIC SUPERVISOR—Graduate nurse qualified to teach principles of public health nursing service to students in patients' homes; outpatient department, large Texas hospital; $125. 114-PH, Medical Bureau, Palmolive Building, Chicago.

STUDENT HEALTH NURSE—Graduate nurse, under 34, with 2 years' college training required; duties largely general duty in infirmary of large school for girls; $100, meals. 115-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate nurse with postgraduate training public health for school health service; coeducational college, Michigan. 116-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR—Department of Health, midwestern state; considerable public health experience in addition to formal training required; beginning stipend vicinity $2,100 (including travel allowance); increase within 6 months. 116A-PH, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH SUPERVISOR — Municipal public health nursing association; must be capable directing fairly large staff in heavy bedside nursing program; New England city of 50,000. 117-PH, Medical Bureau, Palmolive Building, Chicago.

Situations Wanted

BACTERIOLOGIST — Master's degree, eastern university; 8 years bacteriologist and instructor bacteriology, large municipal hospital; for further information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH NURSE—Graduate of fairly large training school; B.S. in nursing, University of Washington; certified public health nurse; 8 years, city and county health work; 2 years, director of nurses, child welfare organization; most recent appointment, consultant nurse in midwestern state department of health; for further information, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

BACTERIOLOGIST—A.B., eastern school; M.S. and Ph.D. (Pathology and Bacteriology), University of Minnesota; several years' interesting research prior to graduate work; especially interested further research or teaching appointment; for additional information please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIAN—B.S., M.D., University of Minnesota; fellowship Public Health, Harvard University, with special attention to occupational diseases and industrial hygiene; 3 years, state department of health; for further details, please write M. Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago.

NEWS FROM THE FIELD

PUBLIC HEALTH DENTISTRY COURSE AT NEW YORK UNIVERSITY

A COURSE in public-health dentistry designed to meet the needs of dentists, dental teachers, dental hygienists, nurses, social workers and others who are interested in the scope and functions of social dentistry is being offered at New York University this fall as part of the program of the Division of General Education, according to Dean Ned H. Dearborn. Conducted by Dr. Alfred John Asgis, of the University's College of Dentistry, the course was to have begun September 26, to continue for 15 weeks.

CHILD STUDY ASSOCIATION INSTITUTE

A TWO-DAY INSTITUTE of the Child Study Association of America will be held at the Hotel Roosevelt, New York, N. Y., November 17 and 18, on "Controversial Areas in Today's Thinking About Children." There will be a preliminary session on November 16, for discussion of some of the problems of leadership, held at the headquarters of the Child Study Association, 221 West 57th Street, New York, N. Y.

Among the subjects scheduled for discussion are: "Habit Training as a Factor in Personality Development," "Psychotherapy in Childhood," "Intelligence Testing Today," "Radio Programs for Children—Recent Trends," and "Education at the Crossroads."

NEW YORK STATE INDUSTRIAL BULLETIN

THE State Department of Labor has resumed publication of its monthly, *The Industrial Bulletin*, with the September issue. Because of the reduction by the 1939 Legislature of the Department's budget for 1939–1940 it has been necessary for the Department to curtail its expenditures for printing, and the July and August issues of *The Industrial Bulletin* were omitted and the number of pages for each issue for the remainder of the year materially reduced. In so far as has been possible, data from the reports which would have appeared in the July and August issues have been consolidated and are appearing in the September issue.

REVISED CARDIAC CLINIC DIRECTORY

A REVISED, up-to-the-minute directory of the city's affiliated cardiac clinics is just off the press and ready for general distribution, it was announced by the New York Tuberculosis and Health Association. The directory, compiled by the Heart Committee of the Association, covers the entire city, lists all cardiac clinics affiliated with the New York Heart Association, notes the clinic chiefs and social workers connected with each hospital, and quotes the hours the various clinics are at the public's disposal. For the first time, it carries a list of employment services and rehabilitation bureaus available to those suffering from heart disease.

The directory is for the use of social workers, public health nurses and teachers, and copies may be obtained free of charge at the offices of the New York Tuberculosis and Health Association, 386 Fourth Avenue, New York, N. Y.

FALLS IN HOME OUTNUMBER MOTOR ACCIDENTS

FALLS in the home caused the deaths of more persons in Iowa during the first 11 months of 1938 than did motor vehicle accidents, according to the State Department of Health. For this period, 462 deaths from fa"s were reported, as compared with 416 motor vehicle deaths.

The greatest toll of lives claimed by injuries from falls was in the age group of 65 years and older. In this group, 405 deaths were recorded, while motor vehicle accidents accounted for 106 deaths in this group, and 188 deaths of persons between the ages of 25 and 64.

Between 25 and 64 years, 42 deaths from falls were reported.

There were 10 deaths of children under 5 years of age, 3 in the age group of 5–14 years, and 2 between 15 and 24 years.

Polished floors, icy porches and front steps, loose rugs, and toys on the floor were given as causes of falls. Several children died from injuries sustained when they fell out of high chairs. Falling out of chairs, out of bed, and tripping were among the causes of death of persons in the oldest age group. The most unusual death was that of a woman who walked out of the house in her sleep and fell into a well. She was rescued but died of injuries from the fall.—*J.A.M.A.*, Sept. 30, 1939, p. 1338.

PERSONALS

Central States

DR. HARRY E. KLEPINGER, of Lafayette, Ind., has been appointed Health Commissioner of Tippecanoe County, succeeding the late DR. FRANK M. BIDDLE, of Battle Ground.

DR. WILLIAM M. MOIR, of Indianapolis, Ind., has been appointed Health Officer of Washington County and Bristol, Va., succeeding DR. EARLE C. GATES, who will attend Johns Hopkins University for the coming year.

DR. AUGUST C. ORR, who has been Director of the Child Hygiene Division of the North Dakota State Department of Health, has been appointed Director of the Sixth District of the Michigan State Department of Health, with headquarters in Newberry.

RAGNAR T. WESTMAN, M.D., DR.P.H.,† of Minneapolis, Minn., has been appointed Director of Health in Kansas City, Kans., succeeding WILLIAM F. LUNSFORD, M.D., M.P.H.,† who died recently.

Eastern States

DR. WALTER G. ALEXANDER, of Orange, N. J., has been appointed a member of the New Jersey State Board of Health, Trenton.

LEONA BAUMGARTNER, M.D., PH.D.,† is leaving her position as Director of Public Health Training in the central office of the Department of Health, New York, N. Y., to become District Health Officer in the Kips Bay Health Center District, New York, N. Y., on November 15. Dr. Baumgartner will also be attached to Dr. Wilson G. Smillie's * Department of Public Health and Preventive Medicine of the Cornell University Medical College, New York, N. Y.

ROBERT P. FISCHELIS, PHAR.D.,† of Trenton, N. J., Executive Secretary and Chief Chemist of the Board of Pharmacy of the State of New Jersey, has been appointed a member of the New Jersey State Board of Health. The appointment comes at a time when a new State Food, Drug, and Cosmetic Act goes into effect in New Jersey, and the legislature has amended the State Health Act to add a pharmacist to the Board. Dr. Fischelis is the first pharmacist to hold this appointment, which is for

a 4 year term under the amended Act.

DR. ABRAHAM FLEXNER has resigned as Director of the Institute for Advanced Study, at Princeton, N. J., due to ill health. He will be succeeded by DR. FRANK AYDELOTTE, President of Swarthmore College, Swarthmore, Pa.

FREDERICK P. LEE, M.D.,* of Paterson, has been appointed a member of the State Board of Health, Trenton, N. J.

MORTON L. LEVIN, M.D., DR.P.H.,† of New York, N. Y., has been appointed Assistant Director on the Cancer Advisory Committee for the new New York State Division of Cancer Control, Albany, N. Y.

DR. CHARLES F. MCCARTY, of Brooklyn, N. Y., recently Medical Director of the City Department of Welfare, has been appointed Associate Director of Medical Activities of the Medical Society of the County of Kings.

GEORGE ALBERT SOPER, PH.D.,* of Brookhaven, N. Y., Consulting Engineer, has been appointed a Consultant in the U. S. Housing Authority. He will actively supervise that phase of USHA housing management concerned with collection and disposal of waste in the public housing projects; and will serve as consultant in public sanitation to local housing authorities in establishing methods of ground maintenance as a joint enterprise of managers of public housing projects and tenants.

Southern States

DR. ALBERT L. BALL, of Gallatin, Tenn., has been appointed Health Officer of Bradley County, to succeed WILLIAM V. SANFORD, M.D.,† of Cleveland, resigned.

DR. JAMES C. BRABHAM,† of Johnsonville, S. C., has been appointed Health Officer of Lexington County. This county was formerly joined with Calhoun County in a health unit under the direction of FRANKLIN L. GEIGER, M.D.,† of St. Matthews, who remains in Calhoun County.

GEORGE F. BROCKMAN, M.D.,† of Louisville, Ky., has been appointed Health Officer of Muhlenberg County, to succeed DR. NEALE M. ATKINS.

DR. PHILIP R. CRONLUND, of Washington, D. C., has been named Health Officer of Lee County, to succeed DR. JAMES M. SUTER, of Jonesville, who will attend Johns Hopkins University for the coming year.

DR. WILLIAM A. DODSON, JR., of Fayette, Ala., has been named Health Officer of Winston County, succeeding DR. PAUL H. HILBERT, of Double Springs, resigned.

DR. THOMAS S. ENGLAR, of Baltimore, Md., has been appointed Health Officer of Albemarle County and Charlottesville, Va., succeeding ROBERT D. HOLLOWELL, M.D.,† who has gone to Shelby County, Tenn.

DR. CLAIR A. HENDERSON, of Dawson, Ga., has resigned as Health Officer of Terrell County, to become Assistant Health Commissioner of Savannah.

DR. JAMES ROBERT HENDON has been named to succeed GRADIE R. ROWNTREE, M.D., C.P.H.,† as Director of Activities in Venereal Disease Control of Louisville, Ky. Dr. Hendon has been Acting Director of this Division.

DR. PAUL H. HILBERT, of Double Springs, Ala., has resigned as Health Officer of Winston County, to join the Health Department in Cincinnati, Ohio.

ROBERT D. HOLLOWELL, M.D.,† Health Officer of Charlottesville and Albemarle County, Va., has been appointed Health Officer of Shelby County, Tenn.

ARCHIE B. HOOTON, M.D.,† of Upper Marlboro, Md., has been made

Health Officer of Allendale and Hampton Counties, S. C., taking over part of the work of DR. LOUIS T. CLAYTOR, who has been in charge of these counties as well as Barnwell and Bamberg Counties. Dr. Claytor will remain as Health Officer of the latter two counties.

DR. JAMES A. LOVELESS, recently of Chattanooga, has been appointed District Health Officer of Rhea-Meigs County, Tenn., succeeding EDWIN N. HALLER, M.D.,† of Decatur.

DR. GEORGE E. MADDISON, of Monroeville, Ala., formerly Health Officer of Monroe County, has been appointed Health Officer of Henry County, succeeding DR. CARL T. MARTIN, of Abbeville, who resigned to enter private practice.

DR. MARVIN E. MCRAE, of Richmond, Va., has been appointed Health Officer of Pittsylvania County, Va., succeeding DR. EUGENE B. SHEPHERD, of Chatham, resigned.

GRADIE R. ROWNTREE, M.D., C.P.H.,† who has served as Acting Director of Health of Louisville, Ky., in the absence of HUGH R. LEAVELL, M.D.,† during the past year, has now been appointed Assistant to Dr. Leavell.

DR. PRICE SEWELL, JR., formerly of Jackson, has been appointed Director of a new health unit in Owen County, Ky.

Western States

DR. FLOYD W. BAUGH, of Burlington, Wash., has been appointed Health Officer of Skagit County.

DR. LEROY L. FATHERREE has been appointed full-time Health Officer of Little Rock, Ark., to succeed the late THOMAS M. FLY, M.D.†

DR. JOHN T. HERRON, of Little Rock, Ark., has been assigned as Health Director of the district composed of Ashley, Desha, and Chicot Counties.

THOMAS D. MENSER, M.D.,† of La Junta, Colo., acting head of the Otero County Health Department, has been appointed Director of the new city-county public health unit in El Paso County, with headquarters in Colorado Springs, Colo.

DR. WILLIAM E. STEELE, of Longview, Wash., has been appointed Chief Medical Adviser to the Washington State Department of Labor and Industries, a position he held several years ago.

DEATHS

A. W. FLICKWIR, M.D.,* Health Officer of Fort Worth, Tex., died July 26, 1939. Dr. Flickwir, who became a member in 1921 and a Fellow in 1923, was a member of the Health Officers Section Council and a member of the Governing Council of the American Public Health Association at the time of his death.

HARVEY CUSHING, M.D., distinguished brain surgeon and educator, died in New Haven, Conn., October 7, at the age of 70.

JOHN W. MCINTOSH, D.P.H., M.B.,† Senior Medical Health Officer of Vancouver, B. C., Canada, died recently.

CONFERENCES AND DATES

American Academy of Pediatrics. Cincinnati, Ohio. November 16–18.

American Association for the Advancement of Science. Annual Meeting —Columbus, Ohio, December 27, 1939–January 2, 1940.

American Education Week — 1939. Theme, "Education for the American Way of Life." November 6–11.

American Public Welfare Association. Round Table and Annual Meeting. Washington, D. C. December 6–10.